GANGA CULTURAL DOCUMENTATION

For the State of UTTARAKHAND

Covering Gaumukh Region, Districts Uttarkashi, Tehri and Haridwar

September, 2019

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NAMAMI GANGE

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Pic.1. Alpine Chough at Gaumukh with Mount Shivling in the background at Gaumukh, with the glacial moraine as backdrop. The Landscape in the Upper Ganga region is dotted with votive offerings to ancestors, like the three stones piled one on top of the other.

On the cover, Ganga meanders through the Gangotri Valley.

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PREFACE

Rivers are not merely flowing water channels. In India rivers are personified as mother deities in view of their nurturing character. Ganga occupies a lonely niche, imbued as it is with an unequalled sacred aura. Building up a narrative which magnifies the sacred and mystical aura of the river is perhaps fundamental to the idea of India.

This documentation of the Upper Ganga Region or the region in the Himalayan state of Uttarakhand is based on extensive archival and field research.

This region is pristine, perhaps the most sacred landscape on earth, with nature and culture embracing each other like no other place. If there is any representative space on earth where the dichotomies of nature and culture, *purusha* and *prakriti* or man and his environment end, it is this. This connect is also represented in numerous shrines with the cooling waters of the Ganga dripping over a *lingam,* satiating humanity.

Pic. 2. Ganga Water over dripping over a lingam

The landscape is the space where the holy Ganga emanates and slakes the thirst – literal and spiritual – of billions.

We have collated present literature with records dating back to ancient texts and colonial records and collated them with presently available literature. In addition, we have depended on anecdotal evidence collected through conversations and visual documentation on numerous field trips to the region.

Manu Bhatnagar
Principal Director
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New Delhi

The rich will make temples for Shiva
What shall I, a poor man, do?
My legs are pillars,
The body, the shrine,
The head, a cupola of gold.
Listen, O Lord of the Meeting Rivers,
Things standing shall fall
But the moving ever shall stay.

…the Lord of the Meeting Rivers
Stays with me
Every step of the way
And looks after me.

- Basavanna, *Speaking of Shiva*

गंगां पुण्यजलां प्राप्य त्रयोदश विवर्जयेत्। शौचमाचमनं सेकं निर्माल्यं मलघर्षणम्।
गात्रसंवाहनं क्रीड़ां प्रतिग्रहमथोरतिम्। अन्यतीर्थरतिंचैवः अन्यतीर्थ प्रशंसनम्।
वस्त्रत्यागमथाघातं सन्तारंच विशेषतः॥

ब्रह्मानन्दपुराण (८०० ई०)

According to the Brahmananda Puran (325-400 CE), the following thirteen activities are restricted in the vicinity of river Ganga:

Defecation, Ablutions, Discharge of Waste Waters, throwing of used floral offerings, rubbing of filth, body shampooing, Frolicking, Acceptance of Donations, Obscenity, offering of inappropriate praises or even hymns in an incorrect manner, Discarding of Garments, washing of clothes and swimming across in particular.
Source: gangapedia.iitk.ac.in

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INTRODUCTION

Water has its own agency and has, for millennia, dictated the course of human social development. Water politics traces profound connections to local histories, rituals of the masses and political economies. As a universal solvent, water has the power to dissolve everything – sins as well as civilizations.

Pic.3. Drinking Ganga Jal by the banks of the Ganga in Haridwar

Small wonder then, that rivers, our prime source of fresh water, are steeped in myth, history, poetry, politics and scientific knowledge. Amongst the world's great rivers, however, few can match the allure of the Ganges. The spiritual appeal and geo-spatial impact of the river is unrivalled. For millions of Hindus there is no question that the river has divine agency. For them, the river is a goddess, the mythical *devi* Ganga, the self-cleaning river goddess that lived comfortably in the heavens but chose to flow on the earth to rid humanity of its sins. The river's geo-spatial impact can be comprehended from the fact that the river supports a staggering ten percent of humanity in all ways in which water is essential for survival – as habitat for biodiversity, for rituals, for nourishment, bathing, drinking, fishing, tourism economies – and much more.

If human actions in relation to the river have profound social consequences, one must attribute a social life to the river itself. Appadurai (1986) laid the groundwork to build a unified approach to understanding socio-ecological systems by asserting that things, and not just people, have social lives. Even though he acknowledged that things acquire value as objects of exchange over time, he postulated that the exchange value of objects is constructed by humans and is not inherent in the objects themselves. To understand the social life of things, he proposed that we should "follow the things themselves" in order to understand their human and social context. This suggests the persistence of a dichotomy wherein the social lives of objects can be deployed as a methodological strategy and not as a theoretical argument. This argument stops short of assigning agency to objects. Latour (2005) and others further added to the idea concerning agency of objects and quasi-objects within social systems, overcoming the binary of method and theory. The particular contribution of Latour's actor-network theory has been the assertion that actors within complex networks are non-human as well as human, and research must empirically determine which of these are more significant and which are less important.

Wagner (2013) emphasizes that if living sustainably in the watersheds is a goal for humans, they must be looked at as whole systems, not systems that are sometimes social and sometimes ecological, and not always both at the same time. This approach helps us bridge the divide between the social and the ecological and foreground the agency of water, assigning to it the same capacity for agency that we assign to the millions of intentional human beings that either depend on it or take decisions on its future. Through such an approach, we overcome the nature-culture binary, looking at water anew.

The durability of the social system that a river like the Ganges supports, depends as much on the objects included within the river system than the social ties between human actors around it. According to Wagner (2013), water is,

> *…clearly a vital, moving and ubiquitous part of biological and ecological life – both the mother of life and its inmost cellular constituent – that it seems animate and is often venerated as such.*

If we agree with Latour (2004) that the social is not something preordained or given, but something we assemble on a daily basis, we must assign to flowing water the agency that we assign to ourselves as intentional human beings.

In its glacial origins at Gaumukh, flowing towards the plains as the Bhagirathi until its confluence with Alaknanda at Devprayag, the Ganga is perhaps still at its cleanest. Pilgrims from all corners of the world throng the region. The Himalayan headwaters of the Ganges, in the state of Uttarakhand, have also witnessed several protracted environmental contestations: the tree-hugging Chipko Movement of the early twentieth century, the anti-dam movements of the seventies and the eighties, and the recent fast unto death of the environmental engineering professor turned monk, G.D. Agarwal, protesting against the forty odd hydroelectric projects proposed in the region. When the government halted construction and declared the hundred kilometer stretch of the river from Gangotri to Uttarkashi, an Ecologically Sensitive Zone in 2012, thereby prohibiting the construction of dams, the recognition that these decisions would impact economic development in the region led to opposition from the state government and locals.

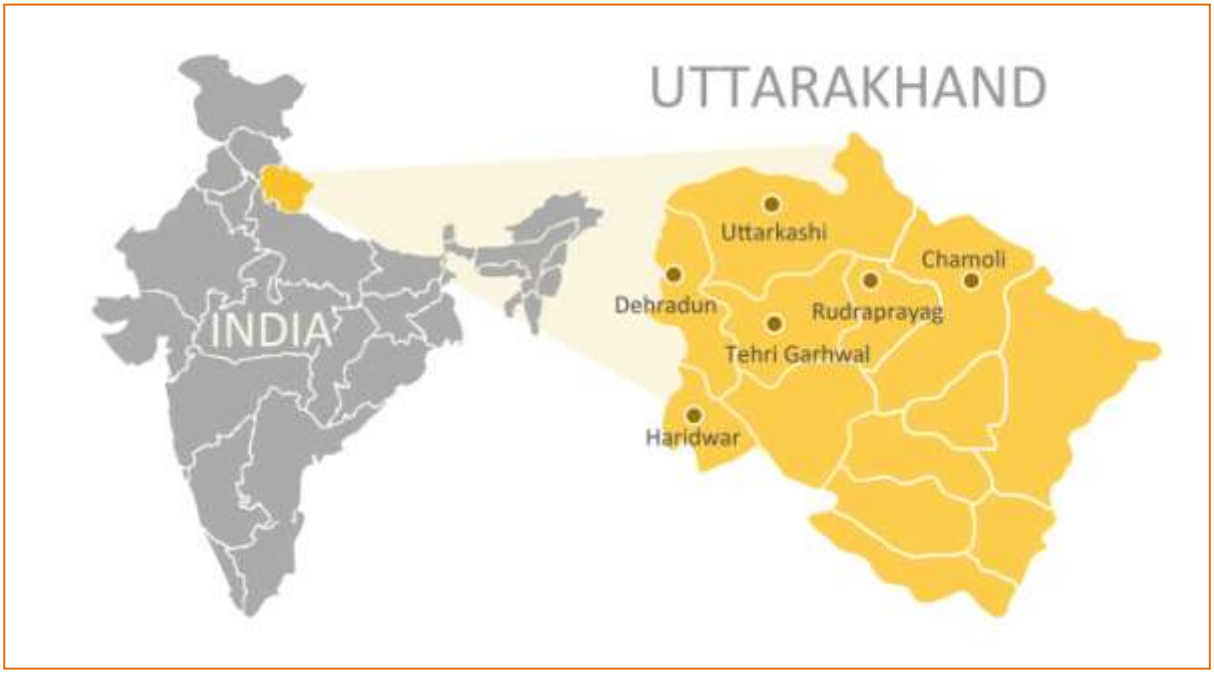
The Ganga region of the Garhwal Himalaya also feeds into the global debate around climate change with the annual recession of the Gaumukh Glacier, the cow's mouth, where the mighty river originates. Measured and mapped on an annual basis, it clearly underlines the horrific

statistic that the glacier has indeed been receding by ten to forty meters every year, since the last two decades or more.

Pic. 4.

Ganga emerges from several glacial melts and springs

Preliminary inquiries reveal that in this region, multiple ontologies are at work that result in the fragmentation of discourse over the health of the river. For instance, while the priests think that their realm of action extends only into ritual and a clean river is beyond its scope, the technocrats treat rites and rituals as blind superstition that in fact contributes to the filth and pollution. It is in this context that we collect ethnographic evidence from the banks of the Ganges to develop a comprehensive understanding of the river.

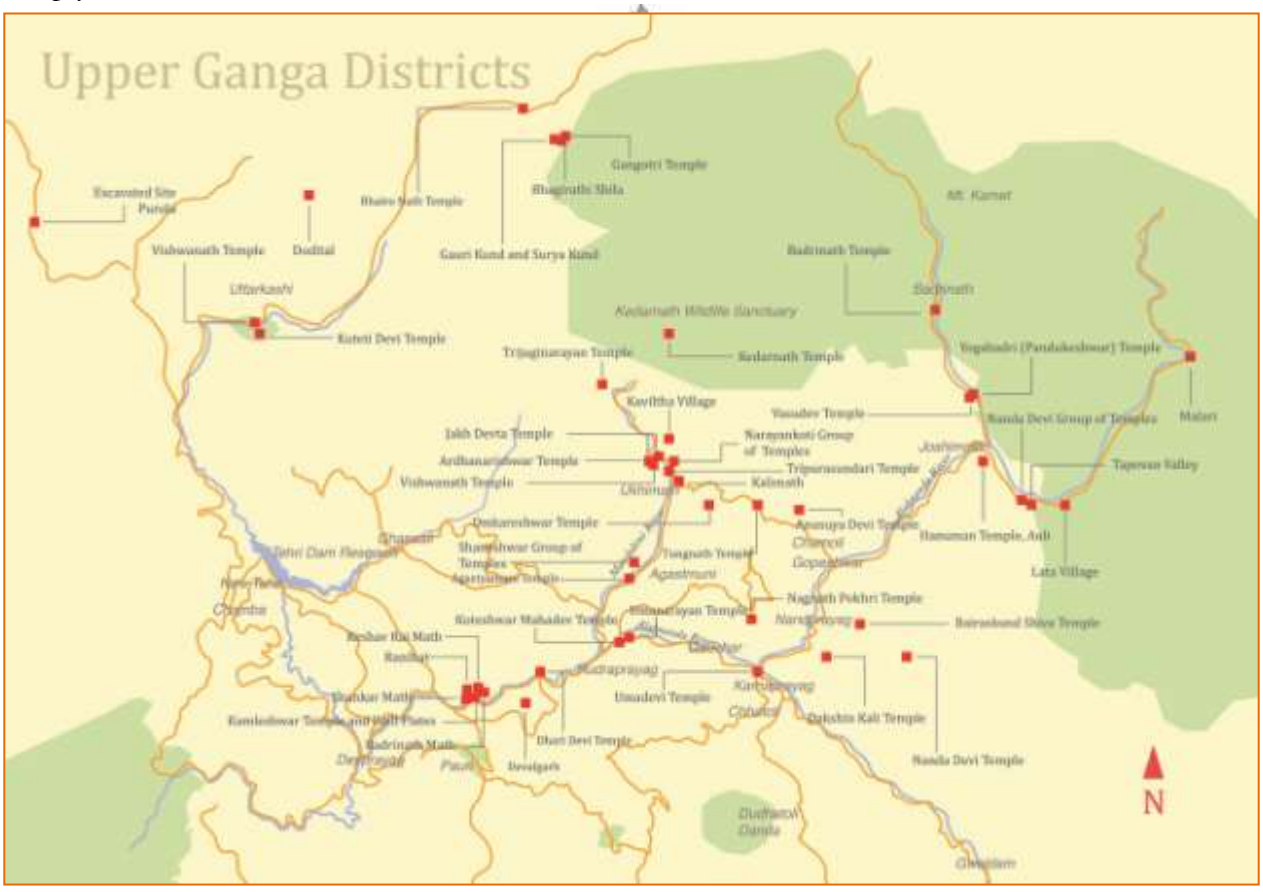


Map 1. Uttarakhand Ganga Region

While social scientists, out of the habit of mind, that arguably lies at the root of

contemporary, unsustainable industrial economies and lifestyles, have stopped short of treating the Ganges as a socio-ecological whole, the legal system in India in the year 2017, accorded to the river, the same rights as a human being. The river, thus, became the first non-human entity in India, to be granted the same legal rights as people. Quoting the example of the Whanganui river, revered by the Maori, which was declared a living entity with full legal rights by the New Zealand government just a week before the judgement, a bench of the Uttarakhand High Court declared the rivers Ganga and Yamuna "legal and living entities having the status of a legal person with all corresponding rights, duties and liabilities". Even though the decision, that would have rendered causing pollution or damage legally comparable to assault, or even murder, was soon turned down by the Supreme Court of India, in view of impracticality as pleaded by the Government of Uttarakhand, the legal decisions merit further inquiry keeping in view that the river faces seemingly insurmountable problems such as 1.5 billion liters of sewage and 500 million liters of industrial waste entering it every day. What this legal battle does provide to us, however, is a starting point from where one can begin to look at the Ganges as an agentive force.

Our research, treating the river as a socio-ecological whole, will uncover multiple perspectives on the river in an effort to bridge the nature-culture binary that has brought about the present situation. By intensively engaging with people – residents and pilgrims in the Himalayas – we shall identify the unifying thread of the multiple layers of reality that makes individuals or groups deeply devoted and also ambivalent about the state of the river.



Map 2. Upper Ganga Districts with their heritage sites

Acting as a source of historic, social, religious and economic importance to the Indian subcontinent since times immemorial; river Ganga is an inseparable part of Indian tradition and mundane life events. Regarded as the longest River of India that forms the most populated catchment in the world, the river along with its tributaries covers ten states of Northern and

Central India. River Ganga covers 2,525 km distance from its source in the Himalayas to its mouth in Bay of Bengal. Owing to the unique properties of the water and the number of lives it enriches and affects the Ganges has established itself as the most sanctified river of India and also the National River of the country. Being closely associated with history and culture of India, the Ganga is referred as the holiest and most sanctified river and is worshipped and revered all through its course right from its source Gangotri Group of Glaciers, to its delta of the Sundarbans at Ganga Sagar.

However, the river also is one of the most polluted rivers of the world. The change in properties of water is due to alteration in water quality and quantity over the years. These changes are on account of exploitation of water for agricultural and industrial uses and also by dumping of huge amounts of sewage and effluents in the river system. The growing web and count of major and minor hydropower projects that hamper the continuous flow of the Ganga are also equally responsible for the deteriorating condition of the river.

Pic. 5.

Pilgrims make their way through paths cut out of glaciers

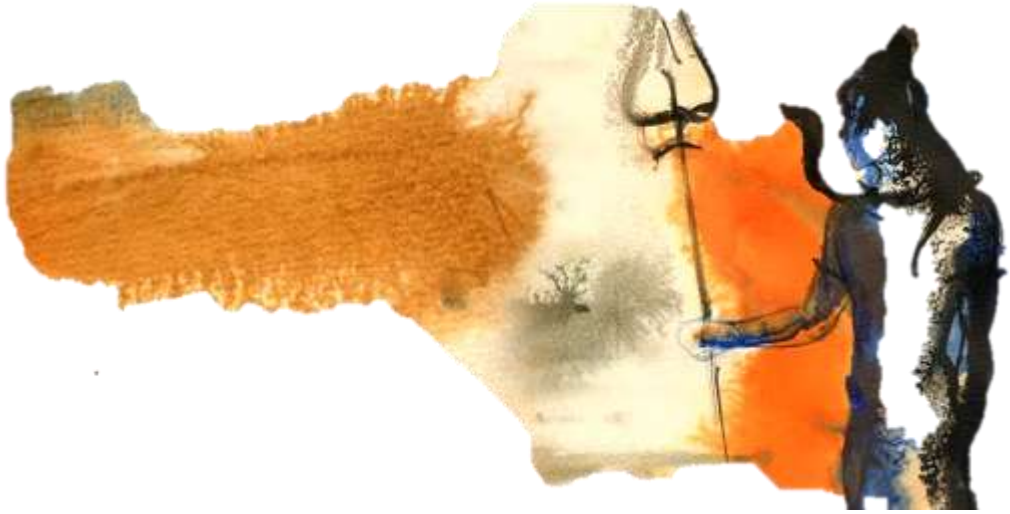
Numerous policies and schemes that largely failed to revive the river, focused on the plains while the upper course of the river remained neglected and is continued being exploited. The huge numbers of hydropower projects that have cropped up on the river, hamper the river dynamics and also affect the associated biodiversity and ecosystems. The June 2013 flash floods of Uttarakhand are a result of short term solutions that overlook future sustainability. The source of Ganga the 'Gangotri Glacier' continues to retreat at a fast pace owing to various reasons that ranges from poorly managed tourism to climate change.

Tourist influx in the state of Uttarakhand, has increased by 155%[1] and is largely concentrated on the Char Dham region, all along the four head water streams that form the Ganga river. This increased tourism has sever impacts on these rivers, increasing the water demands, more amount of sewage and filths in the rivers, demand for more accommodations around these Dhams and also electricity and other similar facilities. The number of tourists visiting the state every year is

[1] Uttarakhand Tourism Figures

60% more than the population of the state; this not only increases pressure on hill ecosystem by increased traffic movements and vehicular pollutions and also affects the carrying capacity of the fragile mountains of Uttarakhand.

The upper course of River Ganga has been naturally bestowed with varied natural and cultural heritage features. With a magnificent source, uncountable streams and tributaries, lakes, towns, temples, beliefs and varied cultures the upper course of Ganga is one of the richest reserves of natural and cultural heritage. But with such the natural and cultural features have been so threatened and exploited, leading to threat of disasters of unimaginable scale. The already vulnerable natural and cultural heritage of this diverse river valley thus needs urgent attention and documentation. The heritage features in the river valley are being sacrificed to developmental models and economic activities. A huge section of this heritage is being lost at a fast pace that needs to be conserved and protected.



CONTENTS

1. DISTRICT UTTARKASHI

Ganga, a river sacred like no other on earth emanates from the Gaumukh glacier flowing through the Bhagirathi Valley. On the banks of the river, the great sage, Adi Shankaracharya, composed one of the most sacred hymns known to man, the Sri Gangastrotram, in the 8th century CE.

> *O Goddess Ganga! You are the divine river descended from heaven, the savior of all three worlds, you are pure yet restless, you adorn Lord Shiva's crown. O Mother! May my mind always rest at your lotus feet.*
>
> *O Mother Bhagirathi! You gift happiness to all. The Vedas sing of your holy waters. I am ignorant and incapable of fathoming your significance. O Merciful Devi! Please protect me.*

Pic. 6. Worshipping the Ganga at Uttarkashi

The hymn extolls the river's virtues in another twelve stanzas, clearly outlining the significance of the river. In order to realize the divinity that abounds in the Bhagirathi Valley, it is important that one walks on the banks of the sacred river. This valley has witnessed the mythical penance of Prince Bhagirath, the poetic eloquence of Adi Shankara, the adventures of Heinrich Harrer in his escape from a British Prisoners of War Camp to Lhasa or even the Jet Boat expedition of Sir Edmund Hillary in his attempt to reach the source of the river.

It would be an understatement to say that the Bhagirathi Valley stands unique in its relationship to humanity. Through this documentation of the region, we make an effort to bring out this unique relationship of the landscape to outstanding values of humanity.

1.1 BACKGROUND

District Uttarkashi, towards the west of the state of Uttarakhand state is a land of pristinemountains, pilgrimage sites and picturesque views of the snow-clad Himalayas. The region is home to many perennial snow-fed rivers emerging from glacial moraines in the Himalayas. The forest wealth, and the presence of free-roaming alpine wildlife make this region a biodiversity hotspot. The region, from Gangotri to Gaumukh, and beyond to Tapovan and Nandan Van, was declared an eco-sensitive zone in 2012 by the Government of India, in order to protect this immense ecological niche that gives rise to the Ganga River System. The region also falls within the Gangotri National Park, thereby leading to its ecological conservation and protection.

In the past, Uttarkashi was a trading hub and several trans-border trade routes passed through the district. The border conflicts forced shut these trade routes. Despite the closure of routes, the fairs of Uttarkashi, like the well-known Uttarayani Fair, are some of the biggest fairs in the region. They were earlier frequented by traders as far away as Tibet and Peshawar. Despite the closure of trade routes, in the district of Uttarkashi are still located some very popular pilgrimage trails and mountain treks.

Bhagirathi River, often considered to be the most significant part of the Ganga in the Himalayas, flows through the district. It is at theconfluenceBhagirathi and Alaknanda, downstream, that the Ganga revered in India, forms at Devprayag in District Tehri. This is why many scholars consider Alaknanda, flowing past the holy pilgrimage site of Badrinath, to also be a part of the Ganga. Mountaineers like Frank Smythe considered the Satopanth-Alkapuri Glacier, towards the western side of Badrinath Temple, to be the origin of the river.

Out of the four *char dhams* in the Himalayas, the four principal places of Hindu pilgrimage – Kedarnath, Badrinath, Gangotri and Yamunotri, the district of Uttarkashi is home to two, Gangotri and Yamunotri.Bhagirathi is the most important river in the district. Several smaller rivers like Alaknanda, Saraswati, Dhauli, Mandakini, Nandakini, Pindar, Garuda Ganga, Rishi Ganga, Patal Ganga, Jadh Ganga, Asiganga, Kedar Ganga, Lakshman Ganga, Bhilangana, Navalika are also referred to as Ganga, as they meet the main stem of the river after the confluence at Devprayag.

The river has been the cradle of Indian civilization since times immemorial and has more than seven hundred towns and cities on its banks as it flows into the plains. Out of these, sixty-two cities have a population of more than one hundred thousand.

The town of Uttarkashi was earlier known as Barahaat, referring to a large market. Over the years, owing to the increasing influx of pilgrims, and the resemblance to the holy town of Varanasi or Benares, the town was renamed as the Kashi of the north, Uttarkashi. Situated on the banks of Bhagirathi, between two streams now known as Varuna and Assi, the place has the names of its *ghats*named after those at Varanasi.Perhaps it was the was the setting up of the oft-visited Vishwanath Temple, with its historic metal trident, that led to the transformation of Barahaat into Uttarkashi.

However, in order to trace the origins of the river Ganga, in the district of Uttarkashi, one has to take the trek to the glacial snout of Gaumukh, the face of the cow, from where the Bhagirathi emerges. In doing so, one has to start at Gangotri and trek through the Gangotri National Park, well known as the home of the Snow Leopard, the blue mountain sheep, Bharal and the distinctive mountain rodent, the Pika. In paying tribute to the unique cultural-ecology of the region, the two major stops along the trek route, Chirbasa and Bhojbasa have been named after the tree species, the Himalayan Pine and the Himalayan Birch or *Bhojpatra*, that are found in the

region. Ancient texts considered as sacred in India were written on the fine parchment like bark of the Bhojpatra trees. Until a few years ago, astrologers used the parchment to write people's horoscopes on.

Pic. 7.

A vernacular home in the Uttarkashi Region

1.2 GAUMUKH

Gaumukh is a glacier situated at an altitude of 4,023 metres. Ringing the glacier are lofty peaks, which are called the Gangotri group of mountains. These include peaks like Chaukhamba, Kedarnath, Thalay Sagar, Shivling, Meru and Bhagirathi I, II and III. Gaumukh is connected with the Gangotri Temple by a foot trail, about 15 kms long, a popular trek among tourists, while also being a pilgrimage route since millennia. One also comes across places like Chirbasa and Bhojwasa, *en route*. A little further, at the base of the Shivling Peak is Tapoban, a space for meditation and hatha yoga. Several renowned yogis have worshipped in the region, living in sub-zero temperatures and conditions beyond human tolerance.

1.3 GEOGRAPHIC LANDSCAPE

At the foot of the Gaumukh Glacier and around it, every glacial melt that deserves to be called a river is termed as Ganga in one form or the other: Akashganga, Amarganga, Kaliganga etc. As author Sudipta Sen (2019) says, "Ganga here assumes a universal suffix, its fluvial cosmology fused with an unchanging and natural order of things."

More than a half a million years ago there was an unprecedented rise in the number and intensity of glaciers in the Himalayas, which coincided with a massive tectonic movement, uplifting the crust and the upper mantle of the earth, that drove the snowline, much further south than it is today, across the lesser Himalayan ranges and the Shiwaliks. This created the lofty feet of the Himadri Range, the snow-capped upper Himalayan ranges. These glaciers have been feeding the river since several centuries. It is believed that during a different part of the Holocene, before the earth's climate became as volatile as it is today, the Gaumukh Glacier must have reached Gangotri. The ice cave has now moved at least 16 km upstream. Today, the glaciers may be

receding, but the glacial melt is still leading to the perennial flow of the Ganga. The landscape here is dotted with Miocene and Pleistocene molassic sediments rising skyward from the quaternary alluvium deposited by the river. This region is dominated by pebbles, rocks and boulders, through which one of the oldest pilgrimage paths known to man meanders through crags towards the source of the sacred river.

Pic. 8.

Ganga emerges from its snout at Gaumukh, 2019

1.4 LEGEND

It is said that searching a lost sheep, a shepherd boy reached near a glacier in Gangotri, the snout of which exactly looked like the mouth of a cow, and thus giving it the name Gaumukh. From then on, many saints, as well as pilgrims have considered it the mouth of the river.

1.5 HISTORIC EXPLORATIONS

Gaumukh has been the subject of several expeditions and historic researches. Even though pilgrims and ascetics must have visited Gaumukh much before the 19th century, no records can be traced.

Pic. 9.

Gaumukh, 1863 (From the Samuel Bourne Collection)

The first recorded visit to Gaumukh is for the 31st of May1817, by John Hodgson and

James Herbert traced the glacial origin of the river. This is what they said about what they witnessed :

> *A most wonderful scene, the Bhagirathi or Ganges issues from under a very low arch at the foot of the grand snow bed, the river here is bounded to the right and left by high snow and rocks, but in front the mass of snow is perfectly perpendicular, and from the bed of the summit we estimated the thickness a little less than 300 feet of solid frozen snow, probably accumulation of ages.*

1.6 THE SOURCE OF THE GANGA IN EARLY DESCRIPTIONS

The early phases in the exploration of the source of the Ganga have been depicted by Colebrooke and describe the first attempts to provide a reliable map of the area, starting from China, because it was then believed that the source was north of the Himalayas and that the river was several hundred kilometers longer than it actually is. One of the early maps was published in Teiffenthaler's three volume set of a description of Hindustan.

In the same volume of the Asiatic Researches where Colebrooke gave his account, Raper's report of his unsuccessful expedition to reach Gangotri and the source of the Ganga in 1808. Gangotri is mentioned first by British colonial officers since Fraser visited the place as the first European in 1815. His and other reports are rathe brief; Hodgson's account is somewhat longer but for the most part only geographical. The following data can be extracted from these reports:

Raper trying to reach Gangotri in 1808 had to give up at Batheri (now Bhatwari) about seventy kilometers from Gangotri due to difficult road conditions. According to Hamilton, Gangotri was first visited by Captain Raper's Munshi (a secretary). Raper himself writes it was Captain Hearsay's Munshi who was in Raper's travel group. He is believed to have gone two miles beyond Gangotri. Therefore, the data on breadth and depth of the river on May 26 and 31,1808, given by Hamilton in his publication of 1828 should be ascribed to Raper's Munshi. Since the data refer to

Gaumukh also, it contradicts Hodgson's statement that the Munshi had been in Gangotri only and two miles beyond. But according to Hamilton's description of the sources this place should be Gaumukh different location of similar physique. The latter assumption is supported by the then following obscurities of his text, especially erroneous altitude readings (see note 46). It probably results from the compilation of several reports in Hamilton's account.

After Fraser in 1815, Hodgson (and Herbert) followed in 1817 to visit Gangotri. The geographical knowledge of the natives at that time was apparently accentuated by mythical beliefs. Thus, Skinner reports that, according to a statement of an inhabitant, the spot of confluence of Bhagirathi and Jahnavi near Bhairon Ghati, ten kilometers below Gangotri, was considered narrow enough to leap over (whereas Skinner measured sixty yards).The first European travelers did not get farther than a few hundred meters beyond the village and they report the natives' opinion that it is impossible to venture higher.

Pic. 10.

Gaumukh Glacier 1860s, Samuel Bourne Collection

According to others, Gangotri was composed of several huts for pilgrims and Brahmins of the temple. Fraser's statement, too, implies that before the temple there was nothing in Gangotri. Hodgson mentions that the two Brahmins of the temple were not able to tell the distance to the source, and that they themselves had never gone beyond the village and thought no one except the Munshi had ventured farther. He goes on to observe that on his way to Gaumukh he passed a place called Bhojpatra, which reminds of the present Bhojbasa, now consisting of a government Rest House and the ashrama of Lal Bihari Baba, about four kilometers before reaching Gaumukh. Hodgson apparently was the first European to visit and describe Gaumukh. As his group climbed the glacier but gave up after about one kilometer, facing the danger of avalanches and crevasses. Fraser reports of the natives' attitude towards the "conquest" of Gaumukh - a religious and devotional one that would forbid direct approach. Apart from that, the physical inaccessibility prevents the ascent. This does not necessarily mean though, that nobody was able, or dared to visit Gaumukh. Even the name, "mouth of the cow", denoting the opening in the ice where the water emerges, suggests that this was physically observed, and not imagined.

The first pilgrims in all probability were sadhus who sociologically, as members of the "nucleus" of religious specialists, and connected with their quality as creative innovators), were in a position to go there. Although this was a kind of 'deviating' behavior from the orthodox Hindu standpoint (of reverential distance) it nevertheless invigorates the system at a meta-level.

Fraser calls the Gangotri temple the most holy in this area. Customs and myths of this area are rarely mentioned in the reports. Skinner speaks of fakirs (he probably means sadhus, or specifically Naga sannyasins) who came to Gangotri in order to die here, as it is customary to do in Varanasi. They tried to starve themselves to death, but Skinner's Brahmin informant assured him that nobody would be allowed to die in such a holy place. So, the sadhus were carried away or fed by force in order to maintain Gangotri's quality of not being connected with death.

The temple Brahmin related a story to Skinner which could be categorized as a 'myth of legitimation'. It is based on the Brahmanical notion of Yuga and legitimizes Gangotri as an important pilgrimage site during the present Kali Yuga: in the golden age (*krta yuga*) it was easy to worship thesource of the Ganga since it was in Varanasi. In the following lower age (*treta yuga*) the source retreated to Haridwar, in the second lowest (*dwapara yuga*) back to Barahaat or Uttarkashi, and finally, in the lowest (*kali yuga*), to the heights of Gangotri. To relate such stories, myths or legends to pilgrims is a fundamental service rendered by temple Brahmins.

The Brahmin Fraser met in Gangotri in 1815 told him that most pilgrims hold the idea of the river originating from a rock resembling the mouth of a cow, as coming directly and visibly from the sky, or the leaves of a sacred birch tree. Furthermore, the Brahmin asserted that these notions were wrong, and instead the river originated from the snow masses.

1.7 IS THE GAUMUKH GLACIER RECEDING?

On our trek from Gangotri to Gaumukh, we came across several markings by geologists, from the past, that pointed towards severe recession of the Gaumukh Glacier. This is worrisome for the future health of the Ganga. Let us delve a little deeper into what is causing this and its effects.

Pic. 11. Markings show the receding glacier of Gaumukh

Glaciers are the consequence of the ice ages. Present glacier cover of the Himalayas is the consequence of the Quaternary Ice Age, and geologists have reasons to believe that the ice limit may have, once, extended beyond the southern limits of the outer Himalayas. Since the last glacial cycle of the Quaternary Ice Age - about 10,000 years ago, practically every glacier has shown degeneration in mass and volume. Same is true of the Gangotri glacier also.

Gangotri glacier is a system with a glacierized area of about 300 km^2. It is situated in the Bhagirathi Valley of the Uttarakhand Himalayas, and comprises a cluster of more than seven glaciers, most of which merge or flow in to the main trunk - known as Gangotri glacier. The latter, flowing in northwesterly direction, is about 30 km long with a glacierized basin of 150 km^2, ranging in elevation from 4,000 ms1 to 7,000 msl.

The Retreat

Behavior of this glacier, since the last glacial activity, can be better illustrated by referring to three distinct observational parameters:

Geomorphologic Evidences

Glaciers, wherever they exist or existed, leave a distinct signature in the form of glacier landforms. These landforms can be the consequence of the glacier erosion or deposition. A survey of the Bhagirathi valley, downstream of the Gangotri temple, has revealed the existence of numerous characteristic glacier land-forms like glacier pavements, saw cut trenches, link cavity system and till deposits almost up to Jangla, a linear distance of 47 km from the present snout position. Presence of so many characteristic glacier land forms leaves no doubt in one's mind that, at one time in the past – most likely during the last phase of glacial activity 10,000 years ago – Bhagirathi valley must have been more glacierized than at present; and the Gangotri glacier must have extended at least up to Jangla.

Medieval Evidences – References from the Classic Literature

The word Gangotri stands for Ganga+utri i.e. Ganga's descent. The glacier has become a part of the legend that speaks of the descent of the Ganga from the heavens, and can take pride of place, though indirectly, of being the earliest explored glacier, in the human history, by Bhagirath about 5,500 odd years back. In Skanda Purana, Bhagirath is quoted to have said, "Then came down from the sky, Ganga the daughter of the snowy mountains, and Mahadev (Shiva) received it (Ganga) on his own head".

Pic. 11A – Gaumukh, 2016

Let it be presumed and rightly so that Bhagirath was an explorer who did the journey as penance to trace the source of this mighty river. What Bhagirath may in fact have stated, when he had the view of the entire glacier from a point up in the mountains, could be, "Ganga coming from the skies frozen around the shoulders of a mighty peak that appeared like the Shivling – a personification of the Lord Shiva". Bhagirath visualized that if the whole glacier would melt all at once, the waters so released would cause havoc down below. In fact, it would be disastrous. And he apparently stated it as such. That, in due course, became the legend that Lord Shiva held the river back in his locks lest Ganga cause the havoc. Legend further tells us that, "Ganga, when it finally managed to come out of the intricate dark locks (moraine ridges) of Shiva which are as fearsome and large as the Himalayas itself, was still so powerful that it went down to the nether world before coming on the surface. The word *pataal* or nether world is obvious reference to the waterfall (Patalganga) at Gangotri.

Pic. 11B - Bhagirathi Peak From Gangotri

Pic. 11C – Shivling Peak From Tapovan

Be that as it may, Bhagirath's metaphorical reference of the Shivling peak, moraine ridges and the water fall at Gangotri clearly indicates that, at the time of Bhagirath's visit, the snout of the Gangotri glacier must have been at and around Gangotri town. Obviously, there was no ice cave, as no mention of Gaumukh has been made, and the glacier apparently must have been in active phase. This view is held by the head priest and other holy men around the shrine of Gangotri who were interviewed by us.

Taking the three possible snout positions, and different periods of time into consideration, Jangla (10,000 years ago), Gangotri (about 5,500 years ago, based on secular retreat) and the present position at Gaumukh, it can be concluded that the glacier has vacated a total linear distance of 47 km in about 10,000 years – the glacier would appear to have shown an average secular retreat of 27.5 m per year, during the last 500 years.

Snout of the Gangotri glacier marked by a prominent ice cave that is renowned under the name of Gaumukh – meaning mouth of the cow – has been the celebrated destination for explorers and the pilgrims over the centuries, for it is where, according to them that Gangaoriginates. Earliest photograph of the snout is that of Samuel Bourne published in 1863 (Refer page 12). Yet another picture of the snout of Gaumukhwas published in 1870. Both these photographs are now in The Oriental and India Office Collections in the British Library, London, U.K. Griesbach, of the Geological Survey of India visited the glacier snout in 1889 and made a sketch of the snout front showing Gaumukh located on the western side of the snout. Dr. Auden of the Geological Survey mapped and photographed the glacier snout in 1935and has, since, been followed by a number of teams from GSI and some other institutes in recent years. A comparative study of the photographs of the snout taken, from time ,to time, shows that the position of the Gaumukh has been shifting from the western limits to the eastern limits of the snout expanse.

Current Scientific Observations

Birbal Sahni Institute of Paleobotany, Lucknow, has dated the trees that are growing over theold terminal moraines at Bhojbasa, about 12 km downstream of the present Gaumukh to be about 415 years old. This would mean that the terminal moraines at Bhojbasa would be about 500 years old, as some time gap must have occurred between the vacation by the glacier and growth of vegetation. Taking that as the base, Geological Survey of India teams have, more or less, regularly since 1935, been monitoring the snout of this glacier and, as a part of the monitoring activity, map of the snout front has been prepared at various times. Comparison of the snout positions between 1935 and 1996 has revealed that the glacier front, especially the position of the ice cave Gaumukh, has been constantly changing and the glacier has retreated by about 1,100meters during the period of 61 years (1935 to 1996), i.e. an average secular retreat of 18 meters a year. A recent study, with the help of satellite imageries has revealed:

1. Position of the Gaumukh along the eastern limits has further retreated at an average of about 15 meters per year in 2001 and 2002.
   2. Raktavaran nala (melt water stream from the Raktavaran group of glaciers) that had been flowing sub glacially till up to 2002 has eroded away the glacier ice on the eastern side and has now started flowing along the valley wall by passing the eroded glacier ice.

Projected Life Span of the Gangotri Glacier

Spate of recent publications, especially on the internet, have come out with frightening prospect of this glacier vanishing from the surface of earth in immediate future. One publication has gone

to the extent of giving 2035 as the last date. Field data does not, however, indicate any such catastrophe. Retreat of 15to18metersorsoperyearisindeed thought provoking, but definitely not alarming. Let us not forget that some of the glaciers in Columbia and even in Alaska have recently shown an annual retreat of more than 200 meters.

In the words of Bhagirath, "Ganga, one day shall be recalled to the heavens!". Reading between the lines, it connotes the fact that even Bhagirath realized, thousands of years ago, that this glacialriver having come from the skies (heaven) shall one day retreat to the skies. If we assume that this glacier will continue to retreat, say at the rate of 15 to 18 meters a year, as it is doing at present, even then it will take almost 2,000 to 1,600years for the glacier, so to say, togo back to the skies.

1.8 INTANGIBLE HERITAGE

The region is generally uninhabited. It reverberates with pilgrims' chants, as also the verses composed by Adi Shankaracharya in the 8th Century CE. The intangible heritage of this landscape is reflected in several travel accounts and the accounts of adventures of people like Heinrich Harrer, who escaped clutches of the British and walked the route to escape into Tibet. Harrer's account of his escape through Bhagirathi Valley forms the subject of his book Seven Years in Tibet.

Heinrich Harrer's Long Walk to Lhasa via Gangotri…

The Second World War began on 1st September 1939 with the invasion of Poland by Hitler's Germany and ended on September 2, 1945 when Emperor Hirohito announced the unconditional surrender of Japan; during these six years the war involved forty-six countries and resulted in 71,090,060 deaths.

From 1940 to 1946, there were around 70,000 Italian soldiers and 1300 civilians interned in Indian camps. They were brought here from the concentration camps of Egypt, Palestine and Greece. In the beginning of 1944, many were transferred to Great Britain and Australia, due to the great famine that had struck Bengal and there were strong protests by the members of the Legislative Assembly in India asking for diversion of the substantial resources necessary for the maintenance of PoW camps to the dying and destitute in Bengal.

Pic. 12. Heinrich Harrer with HH The Dalai Lama

There were six groups of camps in India, the fourth and sixth being in Dehra Dun. The Group 4 camp was set up at Clement Town, Dehra Dun, with a capacity 12,000 PoWs. In the Group 6 camp, again at Clement Town, Dehra Dun, starting March 1941, were jailed generals, from the army, aviation and marine wings, captured in North and East Africa. Almost all the generals were subsequently transferred to the Military Wing of the Central Internment Camp, Prem Nagar, together with 500 colonels. By 10th December 1943, the camp hosted a total of 551 officers including 52 Generals. In 1941, the inmates from Ahmednagar and Deolali Camps were also transferred here.

While a PoW camp was set up for soldiers captured during the actual war, an internment camp was set up for civilians belonging to enemy countries that were either captured during war or were living in India during the war. Clement Town Internment Camp was founded in 1934 by an Italian missionary, Father Clement RC, for the Anglo-Indian troops on the outskirts. Built on the slopes north of the Shiwaliks, the hills to the south of the Himalayas, the forest here merges with the forest of Doiwala.

Twice a day, the prisoners were called to muster and were subjected to the ritual of the counts in the presence of the camp commandant and quartermaster. The prisoners in the various wings built their own sports facilities and tried to keep themselves busy by practicing hobbies.

In June 1939, Peter Aufschnaiter and Heinrich Harrer, along with Hans Lobenhoffer and Ludwig were in India to find a better route to climb Nanga Parbat from Diamir. At the expedition's end, having climbed Diamir Peak (5570m) and Ganolo Peak (6400m), with clouds of war looming, the mountaineers sought passage home on the ship Uhlenfels. However, the vessel had been instructed not to approach India. Unable to find other ships or aircraft, they attempted to reach Persia via the Principality of Las Belas, Balochistan, whose ruler was no friend of the British. Unbeknownst to them, they were being watched and were arrested in Karachi. All four were interned in the Central Internment Camp, Ahmednagar, west of Bombay, and their baggage impounded. Although civilians, they were Prisoners-of-War under the Geneva Convention. The censor returned Aufschnaiter's maps and books, including Bell's book, Colloquial Tibetan, as, being close to Bombay, these were thought to be harmless possessions, little realizing the prisoners would later use them to escape into the Himalayas.

From here while they were being moved to Deolali, Lobenhoffer and Harrer jumped from the back of a moving truck to escape captivity. They were immediately detected and recaptured. They were subsequently transferred to Dehra Dun in October 1941. While on the way at Delhi, Lobenhoffer escaped again, but was arrested at Puri, Orissa. In Dehra Dun, they made many attempts to escape, but failed. Magener, along with one more disguised as a British Officer, with the others as a native wire repair gang, soon attempted another escape. Magener had noted that the unguarded, fenced alleyways—the Chicken Runs—between camp sectors led to a gate where passes were never checked. On 29th April 1944, at 2.30 pm, having broken through the wires into a Chicken Run, they boldly marched through the main gate with the guard presenting arms—a heart-stopping moment—none of them would ever forget. Then they split; five headed for Tibet while Magener and Van Have, went to Burma and Japan. Out of the five that headed to Tibet, three were badly affected by altitude and exhaustion. Finally, they landed back in the Dehra Dun Camp through different channels. Aufschnaiter and Harrer were both hardy, experienced mountaineers, mentally and physically fit for lonely and strenuous walking at high altitudes. They joined the pilgrims along the Ganga, walking up to Gangotri and Gaumukh. After several close encounters with the colonial forces, they managed to cross the porous borders and reached Lhasa on 15th January 1946.

The Dalai Lama's parents entertained the Germans and gave them presents of provisions and cash. Harrer, in fact, became tutor to the present, the 14th Dalai Lama. Harrer and Aufschnaiter lived in Lhasa until 1950 when China invaded and annexed Tibet. Harrer wrote the famous book Seven Years in Tibet, and in 1953, lectured at the Royal Festival Hall, London, where he received a letter from his former Camp Commandant, Colonel Williams, which Harrer read out, "As commander of your prison camp in

India I had to take the blame for your successful escape. Not only that, adding insult to injury, tonight I had to pay to listen to how you did it!"

Harrer devoted his energies campaigning for the Tibetan cause. He died in January 2006.

The physical source of the holy Bhagirathi River is at Gaumukh, 18 kms uphill from Gangotri, along the Gangotri Glacier. Gaumukh can be approached by a two-day trek from Gangotri that passes through the regions of Chirbasa and Bhojbasa. Since this region is a part of the Gangotri National Park, an eco-sensitive zone, only 150 visitors per day are permitted per day towards Gaumukh. Chirbasa is a small forest patch of Chir and Birch trees, thus lending the place its name.

Situated at an altitude of 3580 metres, Chirbasa is today a camping site where tourists camp for the first day. The trek from Chirbasa to Bhojbasa is an arduous one where the terrain becomes steep and rocky. It is on this route that one finds the valuable *Bhojpatra*, the plant that was once used in place of paper to maintain records. Today, one can see Bhojpatra used as logs in bridges that have been built by authorities to cross the several streams en route.

Pic. 13. Bhagirathi I and II Peaks, visible on the route to the Gaumukh Glacier. The moraine in the background is glacial

1.9 FLORA & FAUNA OBSERVED FROM GANGOTRI TO GAUMUKH

1. **Blue Sheep** (Bharal):
    a. Blue sheep, (genus *Pseudois*), also called bharal, are neither blue nor sheep. As morphological, behavioural, and molecular analyses have shown, these slate gray to pale brown sheep-looking caprine are actually more closely related to goats (genus *Capra*) than to sheep (genus *Ovis*).
    b. Blue sheep are sexually dimorphic, with males larger (60–75 kg [130–165 pounds]) than females (35–45 kg [80–100 pounds]). Adult males have beautiful, rather large, backward-sweeping horns (over 50 cm [20 inches] long and weighing 7–9 kg [15–20 pounds]), whereas females have very small horns. Like sheep,

males lack a beard and do not have calluses on their knees or a strong body odour. Like goats, they have a flat, broad tail with a bare ventral surface, conspicuousmarkings on their forelegs, and large dew claws.

c. Blue sheep live in groups; in treeless slopes, alpine meadows, and shrub zones above the timberline; on relatively gentle hillsides with grasses and sedges; and near cliffs, which serve as useful routes of escape from predators. They seldom move farther than 200 metres (600 feet) from a rocky retreat. This is a sheep-like terrain preference, as goats tend to stay on steep slopes and rocky cliffs.
d. Blue sheep populations are heavily affected by hunting. Although even subsistence hunting by locals can prove destructive because of the use of modern firearms, it is hunting by and for foreigners that is particularly damaging to the survival of the species.
e. IUCN Status: Threatened

2. **Himalayan Pika**:
    a. The Himalayan Pika is native to the northern side of the Himalayas. Despite their small size, body shape, and round ears, pikas are not rodents but the smallest representatives of the lagomorphs, a group otherwise represented only by hares and rabbits.
    b. Their fur is long and soft and is generally grayish-brown in colour, although a few species are rusty red. The hind limbs are not appreciably longer than the forelimbs. The feet, including the soles, are densely furred, with five toes in front and four behind. Most Pikas weigh between 125 and 200 grams (4.5 and 7.1 ounces) and are about 15 cm (6 inches) in length.
    c. There are dramatic differences between Pikas that inhabit rocky terrain and those that construct burrows in open habitats. Rock dwellers are generally long-lived (up to seven years) and occur at low density, their populations tending to be stable over time. In contrast, burrowing Pikas rarely live more than one year, and their widely fluctuating populations may be 30 or more times as dense.
    d. The degree of social behaviour also varies. Rock-dwelling pikas are relatively asocial, claiming widely spaced, scent-marked territories. They communicate their presence to one another by frequently uttering a short call (generally an "eenk" or "ehh-ehh"). Burrowing pikas also have a much larger vocal repertoire than rock-dwelling pikas. Many of these calls signal cohesion within family groups, especially among young from sequential litters or between males and juveniles. All pikas utter short alarm calls when predators are sighted. Males give a long call, or song, during the mating season.
    e. IUCN Status: Least concern

3. **West Himalayan Rock Agama:**
    a. Greyish brown agamid with a flattened body.
    b. Breeding males have blue on the body and head. Juveniles have black and white spots.
    c. Lives amongst rocks and boulders.
    d. Mistakenly believed to be venomous, but is quite harmless.
    e. Can be seen often basking in the sun on the rocks, found from foothills up to 3,000 m msl.

4. **Himalayan Snow Cock**:
    a. A hulking game bird of rocky mountain slopes and cliffsides. Native to the Himalayas and adjacent mountain ranges. Gray overall with patchy brown streaking on the breast and two dark brown lines running down the neck. Can be somewhat tame in protected areas, coming down to monasteries for food, especially during the winter.
    b. Small flocks of snowcocks often move uphill during the day, feeding as they go on roots, tubers, and seeds, and then glide down the slopes again in the evening.
    c. The nest is a simple scrape on the ground, often sheltered from wind by nearby rocks or grass clumps. Usually 4-6 eggs are laid, buffy to grayish, spotted with reddish brown. Incubation is by the female, about 4 weeks.
    d. Young leave the nest shortly after they hatch; they are tended by both parents but find all their own food.
    e. IUCN Status: Least concern

5. **Bhojpatra / Birch** (*Betula* sp.):
    a. Deciduous Tree with peeling pinkish-white bark in thin rolls on a crooked. Shiny, white trunk.
    b. Tree mostly slanted or bent due to strong winds and heavy snow.
    c. Bark can be peeled in long strips and an be used for writing on. Our ancient Sanskrit texts and scriptures were written on this bark.
    d. Leaves used as cattle fodder.
    e. As the name suggests, it is utility tree and needs conservation.
    f. Found between 3,000 and 4250m msl.
6. **Blue Pine:**
    a. Dense tree with conical, clumnar crown.
    b. Grows up to 40 to 60 m tall.
    c. Cones are bluish and found upright on the branches.
    d. Found at 2,400 m to 3,000 m. Msl.
7. **Spruce Fir:**
    a. Large evergreen tree with overhanging branches and branchlets.
    b. Needle like sharp pointed leaves.
    c. Found between 2,100m. and 2,300 m. msl.
8. **Medicinal Plants**:
    a. Kutki (*Aconitum heterophyllum*)
    b. Atis (*Picrorhiza kurroa*)
    c. Archa (*Rheum emodi*)
    d. Brahmi
    e. Ashwagandha
9. **Salam Panja** (*Orchis habemioides)*
10. **Ganga Tulsi**
11. **Trees**
    a) Oaks (Banj, Kharsu)
    b) Deodar
    c) Rhododendron
12. **Snow Leopard**:
    a. These rare, beautiful gray leopards live in the mountains of Central Asia. They are insulated by thick hair, and their wide, fur-covered feet act as natural

snowshoes. Snow leopards have powerful legs and are tremendous leapers, able to jump as far as 50 feet. They use their long tails for balance and as blankets to cover sensitive body parts against the severe mountain chill.

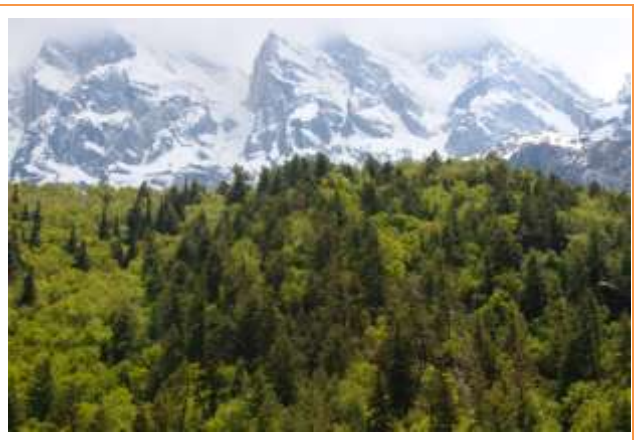
b. Snow Leopards prey upon the blue sheep (Bharal) of Tibet and the Himalaya, as well as the mountain ibex found over most of the rest of their range. Though these powerful predators can kill animals three times their weight, they also eat smaller fare, such as marmots, hares, and game birds.

c. These cats appear to be in dramatic decline because of such killings, and due to poaching driven by illegal trades in pelts and in body parts used for traditional Chinese medicine. Vanishing habitat and the decline of the cats' large mammal prey are also contributing factors.

d. IUCN Status: Endangered

13. **Butterflies**:
    a. Blue Apollo
    b. Himalayan tortoiseshell
    c. Himalayan fritillary
    d. Painted lady

Pic. 14. Bharal or Blue Sheep



Pic. 15. A landscape of Spruce and Blue Pine

Pic. 16. Himalayan Fritillary

Pic. 17. Painted Lady

Pic. 18. Pic. Indian Peepal

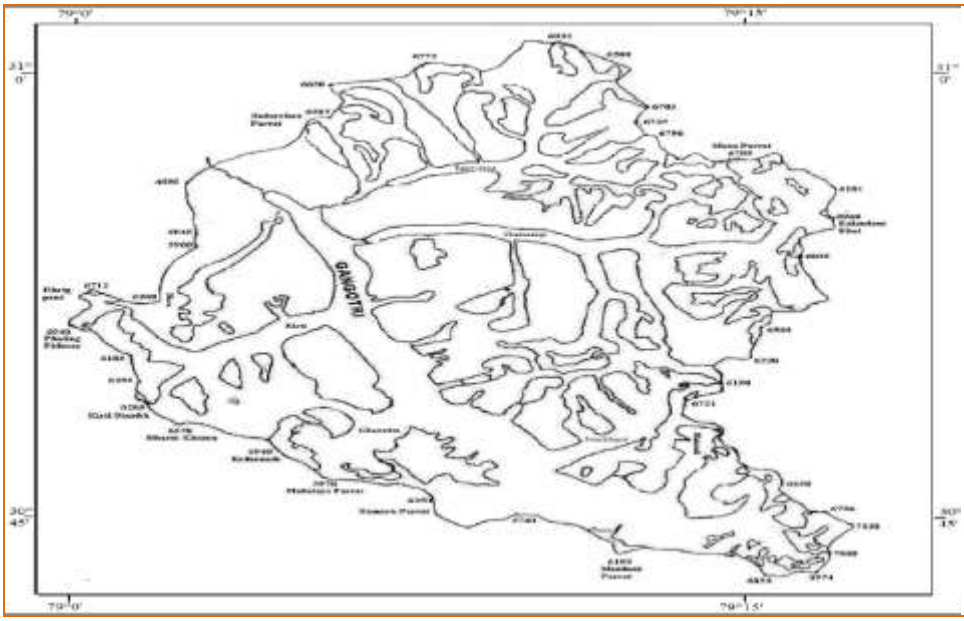
Pic. 19. Himalayan Blue Agama

1.10 ABOVE GAUMUKH

Moving upwards from the Gaumukh Glacier the region is marked with an undulating terrain, with steep slopes, high rocky mountains, and numerous small glaciers feeding number of small streams. The route towards the Gaumukh glacier is a narrow pathway which is dissected across by small streams and landslides. The slopes here are made up of unconsolidated matter and are highly unstable, which was evident by the sight of previous landslides all along the way. The region hosts a variety of alpine vegetation dominated by thick pine trees locally known as Chir Pine. This area also falls under Gangotri National Park and thus is inhabited by variety of faunal species as well. The most common species found in this region is Himalayan Blue sheep or Bharal, which can be spotted in a group of 50-70 animals. Chirbasa a small night halt 9 km away from Gangotri on the Gangotri-Gaumukh pathway accommodates a small forest rest house and camping grounds for pilgrims and trekkers. 'Chirbasa' as the name suggests (abode of chir trees) is vegetated by dense pine trees along with other species like Spruce (*Picea smitbiana*), Silver Fir (*Abies pindrow*), Blue Pine (*Pinus wallichiana*) and Himalayan Cedar (*Cedrus deodara*).

Bhojwasa as the name suggests was once abode of Bhoj/Birch trees (*Betula ultis*). The tree is considered sacred and white paper like bark of the tree known as Bhojpatra was used in Vedic times for writing hymns and scriptures. Once found in abundance at Bhojwasa, the Birch tree, are in scarcity due to changing climatic conditions and excess of deforestation in the region. The birch forest in the region is now being replaced by pine. The topography of the region beyond Bhojwasa consists of unstable and undulating matter devoid of vegetation. Huge rocks and glaciers spread all around in the landscape dissected by small glacial streams and waterfalls.

Tapovan is a small plain in the glacial valley of Gangotri. Situated at an altitude of 14000 ft above sea level, Tapovan is a beautiful spot situated at between Shivling Peak (6540 m) and the Gangotri Glacier. The plain gives a clear view of the three majestic Bhagirathi peaks I (6510 m), II(6450 m), III(6860 m) beyond the Gangotri glacier. Opposite tapovan Nandanvan is another plain bounded by Chaturangi Glacier on the west. The high mountainous trekking route to the famous shrine of Badrinath passes through this Glacier.



Map. 3.

Physiographic Map of Gangotri Glacier

(Source: Dutta et. al 2004)

Vasuki Tal is a high altitude glacial lake situated at an altitude of 4000 meters on the Chaturangi Glacier. The lake is situated at a distance of 6 kms from Tapovan and remains frozen for most of the time in a year. The lake is situated among the moraines and rocks brought down by the glaciers and are composed of crystal clear water of the glacier melts.

Another group of lakes known as Sapt tal or Sattal is situated at distance of 3 kms from the town of Dharali and can be reached by trekking through terraced village fields and dense deodar forests. The region once had seven consecutive lakes however now only two of these lakes survive which too are being encroached upon by villages for agricultural activities.

Two other high altitude lakes are also situated in the region near Bhatwari on the route to Dayara bugyal. The Barsu lake is situated in the small hamlet of Barsu, the base camp for Dayara Bugyal trek. The small lake somewhat circular in shape is a clear freshwater lake amidst thick oak forests. Another lake known as Barnala Lake is situated above treeline on the way to Dayara Bugyal.

Pics 20., 21. The Sapt Tal Lakes

1.11 TRIBUTARIES

Although River Ganga is fed by numerous mighty tributaries, yet traditionally Bhagirathi is considered the source of river Ganga. Another major tributary that originates in the Ganga river

basin from Satopanth and Bhagirath Glaciers near Badrinath is Alakananda that meets Bhagirathi at Devprayag to form Ganga. Although many small streams comprise the headwaters of Ganga, yet six major streams are considered important and also sacred. The Alaknanda, Dhauli Ganga, Nandakini, Pindar, Mandakini and Bhagirathi rivers together form the mighty river ganga. The confluence of these rivers are considered a tirtha and popularly known as Prayags or Panch Prayags. Most of these Prayags are along river Alaknanda in the order Vishnuprayag (on confluence of Alaknanda and Dhauliganga), Nandaprayag (confluence of Alakananda and Nandakini), Karnaprayag (confluence of Pindar and Alaknanda), Rudraprayag (confluence of Mandakini and alaknanda) and Devprayag (confluence of Alaknanda and Bhagirathi to form Ganga).

Besides these numerous other unnamed streams join the Bhagirathi River from its source up to the town of Gangotri. At Gangotri Kedar Ganga originating from Kedar Tal and Rudra Ganga originating at the Rudragyara peaks join the Bhagirathi. Jadh Ganga originating at the Nelang valley near Nandi Parvat joins Bhagirathi at Lanka. At Bhairon Ghati, Jhanvi river joins Bhagirathi, Bharonghati also boasts of the highest bridge of India, with river flowing 103 feet below the bridge.

Other smaller streams in the downstream order are:
Gantang Gad, Gungum Nala, Sarita Gad, Khera Gad,Tel Gad, Kakora Gad, Siyan Gad, Bhela Gad, Son Gad, Lod Gad, Kanauldia Gad, Po-ki- Gad, Kola Gad, Helga gad, Din Gad, Sondar Gad, Nahar Gad, Pilang Gad, Kamar Gad, Gawanra Gad, Binsi Gad, Indrawati Nala, Silam Gad, Rano Gad, Khurmola Gad, Gamri Gad, Nagan Gad, Dichli Gad, Malogi Gad, Jakor Gad.

Pic. 22. Bhagirathi through Harsil

23. Asi Ganga River

The Kakora Gad and Jalandhari Gad join the Bhagirathi at the towns of Harsil and Dharali respectively. Siyan Gad a small tributary joins Bhagirathi at Jhala. The town of Uttarkashi is situated on the confluence of Asi Ganga and Bhagirathi.

Pics. 24, 25. Mud mounds at Chirbasa

Pics. 26, 27. Meditation Cave near Ganganani, Cave near Chamba

1.12 GEOLOGICAL FEATURES

It is widely known that water acts as guiding force in formation of different geological structures. The movement and force of water results into weathering of rocks, and formation of different structures and features. Bhagirathi river acts as a guiding force all along its course resulting into formation of varied and fascinating geological structures all along its length. The river shows different structures as caves, gorges, waterfalls, flood plains and numerous other formations. The mud mounds of chirvasa are not some unusual structure but these mud mounds stand tall since a long time in the midst of frequent landslips and landslides in its immediate vicinity. The mud mounds are present on the left bank of Bhagirathi river opposite the camping grounds of Chirvasa.

Numerous caves and Glaciers are are common site in the region. Formed due to the action of snow, ice and water some of these structures are quite unique and fascinating. Caves are a common sites in this region. Presence of a huge amount of limestone in the geology of the area makes it easier for water and wind forces to make way for caves. Such caves can be easily spotted

on the way to Gangorti near Chamba and also near Ganganani. Ganganani also has a hot water spring source, which is considered holy and is believed to have healing properties. The water in stored in a tank and has a temperature of around 50-60 °C. The water also has traces of sulphur in it that gives it healing properties.

River Bhagirathi flows down a steep slope from Himalayas to the plains forming different structure due to its force of water and the sediment loads. Such structure can be seen at the town of Gangotri where the wreathing force of the river has formed beautiful structures and gorges on the rocks below. Two such structures are identified at Gangotri and are known as Surya kund and Gauri Kund. At Surya Kund the water of the river falls from a height forming a water fall, into a deep round pool of Granite rock with roaring sound. This continuous falling of water has caused the rocks to take up different shapes and formation, giving this water fall a fascinating appearance. At gauri kund the Bhagirathi River falls into a narrow gorge giving river a fast and tremulous flow cutting its way across the rocks.
Beside these a number of waterfalls and glaciers give the region a celestial and serene appearance. These waterfalls carrying clear, white waters are a common site on the way to Gangotri and the glaciers that feed small streams are common sight after Gangotri on the way to Gaumukh.

2 GANGOTRI

The Gangotri temple is situated at an elevation of 3,415 metres. The average maximum temperature that has been recorded in Gangotri is 15° Celsius and the minimum is 2° Celsius.

2.1 CLIMATIC CONDITIONS

Summer here begins in late April and stays until June. The maximum temperature that has been recorded during summer in Gangotri is 20° Celsius. Light woolen clothes are required while visiting Gangotri during summer. Monsoon begins late June with moderate rainfalls. Heavy rainfall is experienced towards late July, which extends till mid-September. Winter season is very cold in Gangotri. Winter begins from November and stays till April. Gangotri is covered in heavy sheets of snow during winter. The temple remains closed throughout winter due to heavy snowfall. The maximum temperature that has been recorded during winter is 10° Celsius and the minimum temperatures can easily touch sub-zero levels.

2.2 ECONOMY

Gangotri is a traditional temple town with the Gangotri temple contributing mainly to the economy of the town. Most residents run small shops that sell*prasad* and idols of Goddess Ganga.

The numerous mules that carry goods and pilgrims to Gaumukh, as well as other sites like Tapoban and Nandan Van, also feed the economy of Gangotri. They are a significant lifeline for inaccessible areas on the borders and to villages not connected with motorable roads.

It seems that trade would have also been significant, but the Sino-Indian wars and consequent border closures have led to the cross-border trade becoming negligible. When the pilgrimage season is on, one can see a large number of people, Van Gujars and hill men engaged in the mule

Pic. 28.

Gangotri Temple on the day of Akshaya Tritiya, reopening after winter

pack economy, carrying people and materials. The system of engaging mule pack operators has not changed since colonial times, with the administration bidding out rights to run the business. Traditional operators participate in the auctions and get rights to operate the mules. Several Nepalese men engaged as porters for goods can also be seen. In earlier times, they would even carry pilgrims on their backs in baskets made out of local cane, known as Ringal.

Government has now encouraged local women self-help groups to prepare the *prasad* offered to the goddess. This sacred substance can now be purchased and taken home by pilgrims. However, there is a need to introduce eco-friendly packaging.

2.3 PEOPLE

The town is inhabited by people engaged in maintaining the temple. Families of priests also reside here. Joint families stay in double-storied houses and the younger residents migrate to nearby towns like Uttarkashi for higher studies.

Communities inhabiting the region are generally referred to as the Bhotiya. The popularization of the indigenous term 'Bhotiya' (also 'Bhotia' and 'Bhootia') was connected to British expansion from Bengal past Nepal to the western Himalayas in the 18th and 19th centuries CE (Brown 1987). Especially its application for groups in Nepal played a crucial role in establishing the association of this term with the Buddhist religion, although ultimately the British applied it to a great variety of groups living along the Indo-Tibetan interface from Bhutan to the Sutlej valley. In our research area British administrators, scholars, and explorers widely referred to the trans-Himalayan trading groups living in the northernmost part of the former United Provinces as 'Bhotiyas' (e.g. Traill 1832; Atkinson 1884; Sherring 1916; Pant 1935). While the geographical origin of these groups is disputed (Saklani 1998), they describe themselves as descendants of immigrant high-caste Hindus (Leder 2003). Although most writers still rely on the term 'Bhotiya', some of them have become highly critical of it, both for historical reasons (Srivastava 1966; Brown 1991-1992) and because many 'Bhotiyas' themselves reject it due to pejorative connotations of Buddhism and beef eating (Nawa 2000).

The 'Bhotiyas' inhabit eight high mountain valleys, all of which are close to international borders in Garhwal and Kumaon, the two administrative divisions and former kingdoms of Uttarakhand. Until the closing of the border due to the war between India and China in 1962, the 'Bhotiyas' were actively involved in trans-Himalayan trade with residents of the Tibetan highland. Sugar, grains, and manufactured-wool products from India were exchanged for salt, wool, animals, and borax from Tibet (Pant 1935). After 1962, agriculture and the use of forests and grasslands became more important for their livelihood.

Pic. 29.
A Jadh Bhotiya couple

The 'Bhotiyas' are not an ethnically or culturally homogenous group. People of the so called 'Western Group' consist of the Jadh, Tolcha, and Maarcha and reside in the Garhwal region under study, while people of the `Eastern Group' are divided into the Johari- and Rang-Shaukas and reside in the Kumaon region. The Jadhs are the dominant Bhotiya group in the region, who once lived in the Nelang Valley near Gangotri, bit had to later move out upon the closure of borders with Tibet.

2.4 MYTHS & BELIEFS

Believed to be the origin of river Ganga, Gangotri was a tough terrain. The *Charaksamhita* dating to around 2000 BCE mentions the water of Ganga as a health supplement while Vagabhatta's 8th century work also has the same advice. In 1060 CE, Chakra Pani Dutt discovered the medicinal properties of the river through comparative research. In 1808 CE, the British East India Company appointed Captain Ripper, Lieutenant Web and Hearsay to find the source of Ganga. This expedition has been elaborated in the 11th volume of Asiatic Research published in 1818.

Owing to its exalted position as the point of origin of the river, the Gangotri region is exalted in myth and belief:

Bhagirath brings the Sacred Ganga to Earth, Shiva restrains it…

Bhagirath was a great sage of ancient India. His grand-uncles had once mistakenly accused an ascetic of theft. As the ascetic flew into a terrible rage at the insult, he used the spiritual powers gained from years of continence to burn them alive. Since his granduncles had died before their pre-ordained time, they were not permitted to enter the land of the dead. Their souls lingered unhappily between the world of the living and the world of the dead.

They begged Bhagirath to find a way of restoring his ancestors into the cycle of birth, death and rebirth. This would become possible only if their ashes were cast into a river known as the Ganga. Ganga was a mighty river that flowed in the celestial realms and Bhagirath had no way of taking their ashes beyond earthly limits. Moved by their plight, he decided to ask the river to flow down to the earth.

He performed such severe austerities that the gods were compelled to let the Ganga come down from the heavens and flow on to the earth. However, the river nymph that embodied the Ganga scoffed at the idea, for she knew that the river's flow was so strong that it would wash away the entire earth. Bhagirath then decided to seek Shiva's help. Shiva stood atop Mount Kailas, his arms akimbo, ready to catch the Ganga in his matted locks before she touched the ground. Ganga leapt from the heavens in all her glorious force, ready to wash away everything that came in her path. But no sooner did she come in contact with Shiva's matted locks, than she found herself trapped in them, unable to break free. She writhed in agony like a caged bird and was only allowed to flow out when she agreed to a gentler flow. As the Ganga gurgled her way out of Shiva's locks through the mountains and across the plains towards the sea, she brought life and laughter to her banks. Bhagirath immersed the ashes of his ancestors into the Ganga. As foretold, his granduncles could now enter the land of the dead, ready to be reborn.

Shiva employed his hair to tame the river of life; some believe that his mat-locks metaphorically represent the Himalayan forests. Ganga embodies the world perceived by the senses; but Shiva is not swept away by the force of Ganga's swirling waters, material transformations, the samsara. The river, like the world, is never still. One can never step into the same river twice; it slips out of clenched fists. Shiva withstands this constant

Pic. 30.

Bhagirath's penance and descent of the Ganges depicted at Mahabalipuram, Tamil Nadu

change with ease and ends up controlling the flow. Had the goddess not been a complement to his being, Shiva would have destroyed the Ganga. However, with the goddess by his side, he is sensitive to the transcendence of the material world. Rather than destroying the river-nymph as he did the love-god, Kamadev, he accepts her. His energy withdrawn through tapasya, or years of penance, also finds a release in the binding of the Ganga.

It was in the 7th century, in the time of the South Indian Pallava Empire that Gangavatarana or 'the descent of the Ganga' found its most dramatic representation on a half-mile long granite rock, in the most spectacular collection of secular and religious architecture known as Mamallapuram. Later, in 1025 A.D., Rajendra Chola built his capital named Gangaikonda, south of Chennai. Ganges water was the only tribute he exacted from the kings he conquered. The Ganga myth has thus travelled far beyond the river's watersheds and permeates human thinking, helping formulate a worldview, not just in the Indian sub-continent but also across the world.

Why Ganga pervades Ritual?

What is river Ganges to the Indian Civilization?

Is it aspiritual symbol or a natural resource - an eco-system, a support for civilization? It is all this and much, much more. It is the fountainhead of the Indian ethos. Something, we could describe as Indian culture. In brief, Ganga embodies the very essence of Indian-ness.

Pic. 31.

An anointed Shiva lingam on the route to Gaumukh

In temples, a pot dripping water continuously from a hole is placed atop the Shiva-lingam. It represents the Ganga, the water of the samsara that forces Shiva to release his tapa for the benefit and welfare of the world. The most common ritual in Shiva temples is the pouring of water and milk over Shiva's lingam so that his energy moves outwards rather than moving inwards, benefitting everyone. Tapa thus transforms into life-sap, rasa, and sustains the world.

The temples that dot the Indian landscape are themselves as much a representation of the agni or fire aspect that represents the power of penance, as they are a representation of the soma aspect, of water from the Ganga represented in its eternal form. They also represent the co-existence of purusha and prakriti, nature and culture as complements and not dichotomies.

As mentioned in the Rig Veda, "Water is female and fire is male: life is born of their intercourse."The Sanskrit name for the sanctum of a temple, house of the womb or Garbh-Griha, establishes this primary meaning.

Just as Ganges finds its presence in our spiritual architecture, she also finds a place in our spiritualized physiology. The Hathapradipika, a yogic text from 14th to 16th centuries, explains the portals of spiritual ascension thus, "The goddess Ganga is Ida (referring to the soma qualities) the river Yamuna is the Pingala (of the Agni traits). Between them lies the Kundalini (the untapped source of spiritual energy resting at the base of the spinal cord)".

2.5 FAIRS & FESTIVALS

River Ganga is a revered water body, which finds a mention in Puranas and contains hymns like the *nadisukta*, dedicated to it in the Rig Veda. In the Gangotri region, the worship of Ganga alternates seasonally between the temple at Gangotri and the temple in the village of Mukhba. As

the river goddess embarks on its journey from soon to be snow-bound Gangotri to its winter seat in Mukhba, Ganga worship begins at the Markandeya Temple. The temple remains open from Akshaya Tritiya to Govardhan Pooja. During winter when the temple is closed, the idol of Ganga is brought in a palanquin to Mukhba village where Ganga is worshipped as the sister of Lord Sameshwar. She comes to her native Mukhba on *bhai dooj* for her brother. The Sameshwar Temple is located in village Mukhba. The rituals are performed by Semwal Brahmins. Bhagirath Shila is believed to be the place where Bhagirath prayed to get the river on earth. Gauri Kund is where Goddess Parvati is believed to have meditated for Lord Shiva. Patangan is considered to be the place where the Pandavas worshipped several deities to ask for forgiveness for *gotra hatya* or fratricide during the Mahabharata. According to texts, they stopped here on their long walk to Kedarnath and then the beyond.

2.6 GANGOTRI TEMPLE

Believed to be the origin of river Ganga, Gangotri remains tough terrain for visitors. The *Charak Samhita* dating to around 2000 BCE mentions the water of Ganga as a health supplement while Vagabhatta's 8th century work also has the same advice. In 1060 CE, Chakra Pani Dutt discovered the medicinal properties of the river through comparative research. In 1808 CE, the British East India Company appointed Captain Ripper, Lieutenant Web and Hearsay to find the source of the Ganga. This expedition has been elaborated upon in the 11th volume of Asiatic Research Papers, published in1818. This expedition established Gangotri and Gaumukh as the points of origin for the great river.

For millennia, visitors have been walking up the precipitous paths in order to meet Mother Ganga. The temple at Gangotri is still flocked by thousands of pilgrims from all parts of the world. The Gangotri Temple was severely damaged in the 1803 earthquake and was rebuilt by the Gurkha Captain, Amar Singh Thapa, in the 18th century. Maharaja Madhosingh of Jaipur, Rajasthan, renovated the temple again in 1935.

On the *ghats* outside the temple of Gangotri, several people from all parts of the country come to perform various rites like praying for ancestors and cremating the dead. Devotees believe that a visit to Gangotri and a dip in the waters here is essential to wash away one's sins. The ceremony of opening and closing of the temple doors is a huge cultural ceremony with an army band welcoming the palanquin of the goddess in the month of April-May and the chief priest chanting the mantras before opening the shrine. Many newlywed brides are brought here to seek the blessings of the goddess.

The temple is the prime seat of the goddess and apart from tourists, brings together several local communities on account of worship.

These include the Jadhs of the Nelong Valley who follow Hindu as well as Tibeto-Buddhist traditions. They tend to have dual identities evident in two names for every individual - Hindu and Buddhist. Their main occupation is arid pastoralist-agriculture and wool weaving as well as knitting. Their work and craftsmanship are highly prized.

Pic. 32. Palanquin of Ganga, immediately before its installation in the temple at Gangotri, post winter

2.7 ARCHITECTURE

The present temple was renovated by King Madhosingh of Jaipur in 1935 to worship Ganga in the form of a goddess. The Puranas mention that Ganga was gifted to heaven by her father Himvaan and brought to earth by Bhagirath on the 10th day of the month of *Jyeshtha*. According to the Puranas, when King Sagar left his horse for the 100th Ashwamedha Yajna or horse sacrifice, Lord Indra saw this as a threat to his power and stole the horse. He tied it in the Sage Kapila's hut where King Sagar and his 60,000 subjects reached soon and blamed the sage for the theft. Angered, the sage destroyed the subjects and it was then that King Sagar and his descendants began to pray to get river Ganga on earth. However, it was Bhagirath who was successful. Aware of the dangers of its uncontrolled flow, Bhagirath prayed to Lord Shiva to keep the river in his locks. Ganga flowed to the earth in three parts (Alaknanda, Kumudvati and Ganga), each flowing from Brahma, Vishnu and Shiva. Several smaller rivers like Alaknanda, Saraswati, Dhauli, Mandakini, Nandakini, Pindar, Garuda Ganga, Rishi Ganga, Patal Ganga, Jaad Ganga, Asiganga, Kedar Ganga, Lakshman Ganga, Bhilangana, Navalika are called 'Ganga' after the region Deoprayag, the confluence of Bhagirathi and Alaknanda. The river has been the bed of civilization and has more than 700 towns and cities on its banks with 62 cities having a population of more than one lakh. It spans from Gaumukh in Uttarakhand to West Bengal. Many historians believe Alaknanda, which flows from Badrinath to be the origin of Ganga. Mountaineers like Frank Smith consider the Satopanth-Alkapuri glacier towards the western side of Badrinath Temple to be the origin of the river.

Pic. 33.

Welcoming the dev-dolis

The temple at Gangotri is believed to have been consecrated by Adi Shankaracharya. The Gangotri Temple was severely damaged in the 1803 earthquake and was rebuilt by the Gorkha captain Amar Singh Thapa in the 18th century. However, the temple was renovated in 1935 by the Maharaja of Jaipur, Madho Singh, which is why its architecture resembles the Rajasthani style.

At Gangotri the priests are Semwal Brahmins from the nearby village of Mukhba. They perform all the key rituals. On the occasion of Akshay Tritiya, the temple doors are thrown open to devotees after a gap of six months and it is mandatory that two out of the following four people are present to open it- the local Member of Legislative Assembly, the Sub-Divisional Magistrate, District Magistrate and Superintendent of Police.

The doli of goddess Ganga leaves from the Mukhwa temple a day prior to the auspicious day and is carried by the Semwal Brahmins. The authority of carrying the palanquin is taken up by the 'Shri Paanch Bhai Gangotri Samiti'. A military Band of the military regiment stationed at Harsil is present at the Ganga Temple along with the Dolis of the local deities from the nearby villages to welcome her. These deities include Shesh Naag Devta, Kandaar Devta, Narsimha Devta etc.

The *dolis* come, in no specific order, to the banks of river Ganga and take a holy dip (*snan*) and then proceed to the main Ganga temple where Ganga *pratima* (image) is worshipped, one by one. No *doli* stays back; they return to their villages the same day. Every time a palanquin enters the temple, the military band performs. There are no definite deities that are obligated to visit every year. One can witness the devotees in trance state of devotion.

Ganga worship begins from Markandeya Temple. The temple remains open from Akshay Tritiya to Govardhan Pooja. During winters when the temple is closed, the idol of Ganga is brought in a palanquin to Mukhwa village where Ganga is worshipped as the sister of Lord Someshwar. It is believed that she comes to her native Mukhwa on *bhai dooj* for her brother. The Someshwar Temple is located in village Mukhwa. The rituals are performed by Semwal Brahmins.

The Puranas mention that Ganga was gifted to heaven by her father Himvaan and brought to earth by Bhagirath on the 10th day of the month of *jyeshtha*. It is believed that Suryavanshi King Sagar, after killing the demons on earth, decided to perform the Ashwamedh Yagna as assertion

of his supremacy. The horse was to be taken on an uninterrupted journey around the earth accompanied by his 60,000 sons. Indra, fearing their success and his throne, stole the horse and tied it in Kapil Muni's ashram while the sage was deep in meditation. The sons came across the ashram in pursuit and on finding their missing horse there, rudely demanded the saint for the same. When Kapil Muni opened his eyes, all 60,000 of them were turned into ashes. Sagar asked for forgiveness, but the curse could not be reversed. However, Kapil Muni suggested that if the holy Ganga, the river of heaven, were to come down to the earth, the touch of her waters would ensure the liberation of the princes. Many descendants of Sagar failed in their efforts to bring the holy Ganga to earth, until Bhagirath was born. He continued his severe penance until Ganga agreed to come down to the earth from the heavens. But her surge was so fierce that her fall was sure to cause disorder and disaster. Thus, Bhagirath prayed to Lord Shiva to contain Ganga in His matted locks, who in turn agreed, thereby releasing only a few drops of her celestial waters. That is the reason why, the Ganges is called River Bhagirathi here and it becomes Ganga only at Devprayag after meeting the Alaknanda. The river thus flowed on earth, delivering the sons of Sagar from their curse, cleansing all that was impure in her path. Ganga flowed to the earth in three parts (Alaknanda, Kumudvati and Ganga), each flowing from Brahma, Vishnu and Shiva.

Lord Shiva received the heavy downpour on his matted locks and released it forth from his locks in seven streams. The seven streams of Ganga are Bhagirathi, Janhvi, Bhilangana, Mandakini, Rishiganga, Saraswati and Alaknanda, which merge to form the Ganga at Devprayag.

Bhagirath Shila is believed to be the place where Bhagirath prayed to get the river on earth. Gauri Kund is where Goddess Parvati is believed to have meditated for Lord Shiva. Patangan is considered to be the place where the Pandavas worshipped several deities to ask for forgiveness for *gotra hatya* or fratricide during the Mahabharata. According to texts, they stopped here while going to Kedarnath.

2.8 FUNCTION

The temple exhibits Rajasthani style of architecture. The temple is made of white granite stones. The *shikhara* is 20 feet high and stands atop ten*angashikharas*. It has an east facing entrance. The elements of the plan consist of a *garbha griha* having idols of Ganga, Yamuna, Mahalakshmi, Annapurna, Saraswati, Bhagirath and Shankaracharya. Close to the temple stands a rock called Bhagirath Shila and a stream Gauri Kund which has a naturally occurring Shiva Lingam. Patangan is a ground made from huge rocks. The route from Gangotri to Gaumukh glacier has Hamkya Chatti, Devgad, Bhangalwasa, Chirbasa, Bhujgaddi, Bhojbasa. Beyond Gaumukh lies Tapovan, Nandanvan and Vasukital, from where a trail leads to Badrinath.

Extreme weather and ingress of glacial waters have caused cracks on the temple building and the complex wall. A portion of the wooden roof planks has broken.

The temple complex displays the impact of haphazard development and deployment of synthetic materials. The courtyard has been overlaid with white marble, while the *mandapam* of the shrine itself is covered with a shiny golden material that appears to be plastic sheet. This contrasts with the copper covering over the *shikhara.* Facing the temple, toward the left, facing the Ganga, a greenhouse or conservatory made of glass has been constructed with support from a public sector undertaking, which appears obtrusive and out of place. New offices and guest houses have been added around the complex, obstructing the openness and grandeur that the fabulous landscape around it would have once provided to the shrine.

2.9 SACRED GEOGRAPHY

According to the traditional history, a Suryavanshi King Sagar, after killing the demons on earth, decided to perform the Ashwamedh Yagna as assertion of his supremacy. The horse was to be taken on an uninterrupted journey around the earth accompanied by his 60,000 sons. Indra, fearing their success and his throne, stole the horse and tied it in Kapil Muni's ashram while the sage was deep in meditation. The sons came across the ashram in pursuit and on finding their missing horse there, rudely demanded the saint for the same.

When Kapil Muni opened his eyes, all 60,000 of them were turned into ashes. Sagar asked for forgiveness, but the curse could not be reversed. However, Kapil Muni suggested that if the holy Ganga, the river of heaven, were to come down to the earth, the touch of her waters would ensure the liberation of the princes. Many descendants of Sagar failed in their efforts to bring the holy Ganga to earth, until Bhagirath was born. He continued his severe penance until Ganga agreed to come down to the earth from the heavens. But her surge was so fierce that her fall was sure to cause disorder and disaster. Thus, Bhagirath prayed to Lord Shiva to contain Ganga in His matted locks, who in turn agreed thereby releasing only a few drops of her celestial waters. That is the reason why, the Ganges is called River Bhagirathi here and it becomes Ganga only at Devprayag after meeting the Alaknanda. The river thus flowed on earth, delivering the sons of Sagar from their curse, cleansing all that was impure in her path. Lord Shiva received the heavy downpour on his matted locks and released it forth from his locks in seven streams. The seven streams of Ganga are Bhagirathi, Janhvi, Bhilangana, Mandakini, Rishiganga, Saraswati and Alaknanda, which merge into Ganga at Deoprayag. The Bhagirath Shila, named after Bhagirath, is a sacred rock. Besides, pilgrims and locals worship the Ganga here as well as the forests forest around it since it is believed to be the harbinger of human civilization.

Pic. 34.

Truly a sacred geography along the Ganga near Gaumukh

The Travelling Devtas of Uttarkashi

By its very name, the term devta implies a divine entity. The Western Himalayas have a tradition of itinerant devtas, which most historians believe, could be a precursor of the human kingships prevalent in India in ancient times.

The devtas of the Western Himalayas are essentially non-human agents that are installed in temples and also carried on the shoulders of the Rajput and Brahman bearers from village to village. Some of these devtas travel constantly when invited to villages. Here, they perform various functions like blessing new born children, welcoming brides, exorcising ghosts, causing rain, delivering justice by presiding over cases, and even inaugurating new temples built for them. The devta system works through the ritual of procession and possession, where chosen men or malis get possessed by them and the divine speaks through them. Since the devtas possess all the attributes of political figureheads of the past, they are also referred to as divine kings.

Pic. 35.

A devta palanquin in procession

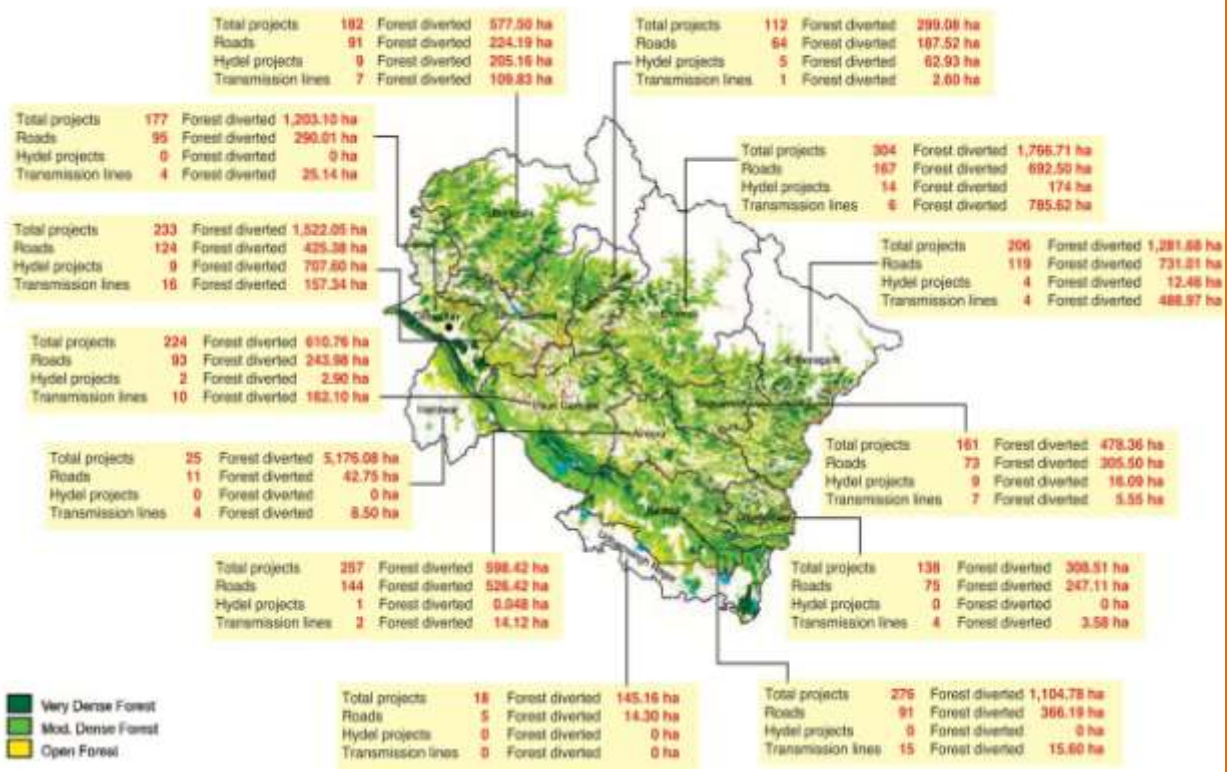
The devtas function from the temples, also referred to as kots or fortresses in the local dialects. They are required to process, their images concealed in silver box-like palanquins, known as dolis. When in procession, the dolis seem to acquire their own agency, as if moving of their own accord. They usually follow pre-determined pathways but at times may divert and walk towards a new destination.

The devtas have their own officials like minister, priests, store keepers and militia. They also are considered rain makers in times of drought.

The devtas own lands and treasures and owing to strong belief systems as well as faith, possess much political power. In fact, they have a say in choosing candidates for elections too. When the British invaded the region, they also acquiesced before the power of the devtas and sought their help in land settlements and subduing the volatile hillmen.

2.10 PROBLEMS & PROSPECTS

Immense pressure of visitor influx and construction at nearby villages are a threat to the area. Also, experts have recorded, and the locals share how the glacier is receding because of rising temperatures. Experts all over the world have attributed the flash flood disaster of Uttarakhand, that claimed several lives in 2013, to extreme weather conditions, which were exacerbated by rapid unplanned developmental activities, unregulated planning, unmanaged tourism influx and deforestation. Kumar S. (2013) in his article on Uttarakhand disaster mentioned that in only 12% regions, compensatory afforestation has been achieved in Uttarakhand which was a major trigger that aggravated the floods. As per data from the Union Ministry of Environment and Forests (MoEF), since the 1980s, 44,868 ha of forestland have been diverted to non-forest use in Uttarakhand. 9,500 ha of this have been diverted for construction of roads, 5,500 ha for hydel projects and 3,100 ha for transmission lines. The report also mentions that 68 % of this diversion took place after the formation of Uttarakhand as a separate state. In case of compensatory afforestation -native vegetation is ignored and most of this compensatory afforestation is done in a completely different area that does not help in any ways. The Bhagirathi valley is among the worst affected regions in this disaster.



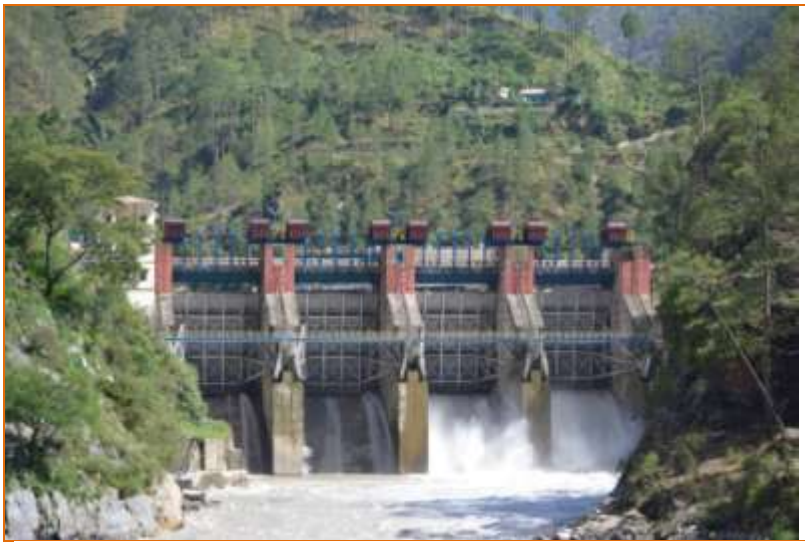
(Source: www.downtoearth.org)

Map 4: Forest Map of Uttarakhand showing level of deforestation

The accelerative number of dams and other hydroelectric projects proposed, approved and constructed in the region greatly affected the vegetation and stability of slopes in this fragile river valley. Also the unplanned road extension to inaccessible places has increased the tourist and pilgrim influx to these areas and has also damaged the terrain. The increase in the landslide events in the recent years has been largely attributed to the blasting of the mountains that make

them prone and exposed to environmental damages. The present techniques used in road constructions leave the mountains unstable. The more the number of tourists the more facilities they seek which in turn leads to unplanned construction and pressure on other ecosystem resources.

The heavy down pour in the region that prompted the weak slopes in this region for major and minor landslides was aided by these activities. Most of the damage in these areas occurred due to landslides and on the roads along the river valleys. All these factors have made the fragile ecosystem of Himalayas even more unstable and prompted unprecedented scale of devastation. Experts are in an opinion that the promotion of the state as a tourism destination is blocking its way to sustainable development.



Pic. 36.
Maneri Bhali Dam near Uttarkashi

Table 1 : Existing Hydropower projects in Uttarakhand

According to South Asian Network for Dams Rivers and People, Uttarakhand has total of 86 existing hydropower projects, with total installed capacity of close to 3600 MW. At least eleven of these projects are in private sector with total capacity of over 503 MW. An additional about 1800 MW capacity is in central sector. It means that majority of the power generation capacity in the state is not owned by the state and there is no guarantee how much of that power would be available to the state.

Pics. 37 and 38. Damaged Asi Ganga I Hydroelectric Project Site

Pic. 39. Damaged Wier of Bhilangana I Hydroelectric Project

Pic. 40. Small Hydroelectric project at Gangotri

2.11 IMPACT OF HYDROELECTRIC PROJECTS ON ENVIRONMENT

Usually all the hydroelectric projects involve deforestations or submergence of forested areas. This deforestation largely increases erosion, landslides and floods to many folds, as the binding capacity of soil is lost. The compensatory afforestation even if done ,usually is planted with commercially important varieties like Pinus and Teak and native vegetation that largely involves broad leaved trees like Oak are ignored. These native varieties allows rich under growth along with adding humus to the soil and protection from direct rainfall.

All these hydroelectric projects require ample amount of construction of roads, buildings, tunnels and housings, that require desilting, moving of earth and blasting which affects the environment adversely and add to the disasters. With huge number of these projects coming up in whole of the river valleys in Uttarakhand their impact is enhanced and is evident by the recent disaster in the state.

These projects also create huge amount of debris which is illegally dumped in rivers and small streams, resulting into siltation of the dams and chocking of the river bed, allowing rivers to carry huge amount of loads.

As per the EIA guidelines projects below 25 MW do not require EIA, Social Impact Assessment, and Public Consultation, Environmental clearance or any other permissions. But being operated in sensitive and fragile ecosystems of Uttarakhand, and also huge number of projects, these projects do have an overall impact, which need to be addressed and monitored.

The towns and small cities developed in the Yatra route to support pilgrimage have other problems. The traditional houses in these towns and cities have been replaced by concrete structures. Proper sewer disposal systems are not installed. The present sanitary systems pour the entire sewer in streams and rivers and in case of septic tank pollute the ground water. The problem may not appear to be severe if looked at the population of these places, but during the Yatra season these places are flooded by lakhs of pilgrims every month, disturbing the natural regeneration and degradation capacity of the nature. Also no proper waste disposal system is installed in these places, and most of the wastes are either burned or are disposed off in water bodies and rivers. A weak waste collection setup is installed during the Yatra season for collecting and disposing wastes. This system though functional is installed only in the towns and cities that fall on pilgrim route, their status in the higher reaches and villages is still unknown.

Being populated and visited by largely pastoral communities that own large number of livestock (cows, buffaloes, goats and sheep); which execute huge biotic pressure on the delicate ecosystem of the region. This forms another prominent problem faced by these ecosystems. Scores of hazards as erosion, and species loss that further contribute to other severe problems of landslides and deforestation, comes due to unplanned and unmonitored grazing activities. There is no system to check on the carrying capacities of these ecosystems and the population of grazers. The increasing populations of the cattle, which are sole earning source for some of the communities, have brought immense pressure upon the carrying capacity of the grazing lands. The goods produced by these animals are sold in the nearby markets and villages to earn a living, by a huge fraction of population in the area. Pastoralism comes as a major source and system of employment and income generation for Himalayan communities and also as a threat to the ecosystem.

Observing the impact of the disaster it is quite evident that most of the damage occurred on the sites of unplanned development. The most important part of transportation 'Roads', were also the most affected. It has been observed that most of the damage occurred due to damage to the road networks that were usually constructed along the flow of the river. One of the reasons that these roads were most affected, was the planning process taken up during the construction. Slope stabilization processes are never adopted and severe blasting and cutting techniques are utilized in construction of these roads. The debris generated by these projects are dumped on the side of the roads or in the river that leaves both upper and lower portions of the road unstable and prone to landslides. These places are never tried to be revegetated and this has left the road networks of the region very vulnerable to landslides and debri-falls.

The June 2013 disaster has pushed back the economy of the state to a decade, which means loss of a huge amount of revenue and also public property. The tourism business has come to a halt after a disaster and the local communities are hard hit by this economic crisis. This has projected to increase migration from hills to plains for employment, which already is a huge problem for the state. The developmental activities in the state thus need proper policy and regulations that keep in mind the complexities of the fragile ecosystem and also benefits of the local communities.

Pic. 41. Damaged road networks

Pic. 42. Unstable upper and lower slopes after road constructions

2.12 WASTE MANAGEMENT SYSTEM

Waste disposal is a major issue here since a lot of plastic waste is generated during the pilgrimage season. On the site, the burning of plastic waste was visible. Most local residents and business houses have no education on proper disposal of waste. Pilgrims are equally guilty of improper waste disposal.

2.13 NATURAL HERITAGE

The landscape in District Uttarkashi is richly endowed with biodiversity.

Birds

Numerous avifaunal species can be seen as you trek to Gaumukh, observing the species change as one gains or loses altitude.

Pic. 43. Chukar Pheasant (Alectoris chukar)

The most common bird at Gaumukh is the Alpine Chough. The Alpine chough, or yellow-billed chough, is a bird in the crow family, one of only two species in the genus *Pyrrhocorax*. The bird can nest at a higher altitude than other birds. The eggs have adaptations to the thin atmosphere that improve oxygen take-up and reduce water loss.

This bird has glossy black plumage, a yellow beak, red legs, and distinctive calls. It has a buoyant acrobatic flight with widely spread flight feathers. The Alpine chough pairs for life and displays fidelity to its breeding site, which is usually a cave or crevice in a cliff face. It builds a lined stick nest and lays three to five brown-blotched whitish eggs. It feeds, usually in flocks, on short grazed grassland, taking mainly invertebrate prey in summer and fruit in winter; it will readily approach tourist sites to find supplementary food.

Although it is subject to predation and parasitism, and changes in agricultural practices have caused local population declines, this widespread and abundant species is not threatened globally. Climate change may present a long-term threat, by shifting the necessary Alpine habitat to higher altitudes.

On the road to Gangotri, one can witness birds such as cormorants and egrets, by the river bank. At the fresh water streams, the White-capped Redstart and Plumbeous Redstart are commonly seen, foraging for insects near the water. As one begins the ascent from the foothills, a variety of Himalayan birds appear. The melodious song of the Blue Whistling Thrush can be heard from the foothills all the way up to 3,000 m. In the bushes and shrubs, a variety of insectivorous birds such as tits (Cinereous Tit, Black-lored Tit), numerous species of leaf warblers (Hume's Warbler; Lemon-rumped Warbler, Buff-barred Warbler) and flycatchers (Grey-headed Canary; Verditer

Flycatcher) can be spotted. In Chir Pine forest, the occasional woodpecker (Himalayan Woodpecker, brown-fronted Woodpecker) will peck away in search of insects. The Red-vented and Himalayan Bulbul are constant companions on berry-bearing bushes.

All along the trek route, a look above in the sky, especially during a warm day, will reveal birds of prey. Himalayan Griffons are still common, despite the vulture decline in the rest of the country. The soaring Bearded Vulture, with its moustache, is a marvelous sight. Other birds of prey that can be seen commonly are the Crested Serpent Eagle, Mountain Hawkeagle and an occasional Common Kestrel or an accipiter such as the Shikra or sparrow hawk.

As you ascend, and enter in oak and rhododendron forest, the bird life, too changes. The tits (Green-backed Tit, Black-throated Tit) and flycatchers (Ultramarine Flycatcher, Dark-sided Flycatcher) species change. The corvids-the Magpies (Red-billed Blue Magpie at lower altitudes and the Yellow-billed Blue Magpie higher up), the Jays (Black-throated Jay and Eurasian Jay) and the Large-billed Crow can be heard calling raucously. Black Bulbuls can be seen feeding on fruiting trees and feeding on flower nectar.

Pic. 44.

Pika, the tail-less long-eared Himalayan rodent

Above 2,000 m, the beautiful pheasants can be seen occasionally; the Himalayan Monal, Uttarakhand's State Bird, the Koklas Pheasant and if you are really fortunate, the Cheer Pheasant.

As one approaches the alpine meadows, the juniper-lined bushes are home to many breeding birds in the summer months such as the bush robins, bush warblers, accentors and rosefinches. At the alpine meadows, one can spot the Mistle Thrush and possibly a few Black-throated Thrushes. And if you are really fortunate, a glimpse of Snow Partridges above 3,000 m will thrill you. The Chukar Pheasant, or Chakor, is also visible in patches. It has distinctly marked white bars.

Mammals

Large mammals are not spotted easily in the West Himalayan landscape. At lower altitudes, you might just see mongooses (Small Indian Mongoose and Grey Mongoose) scramble across your path. During the day, you are likely to hear the dog-like bark call of the Muntjac or the Barking

Deer, heard more often than seen. An occasional jackal might just hare across the path. Along the trek, from the foothills all the way up to mid-altitudes, the ubiquitous Rhesus Macaque, normally in troops of 30-40 macaques, will watch you with beady eyes, hoping to snatch a morsel or two from your backpack! The Terai Langur (between 300 and 1,600 m) and the Himalayan Langur (between 1,500 and 3,000 m), can be seen occasionally along the trek.

And if you are fortunate, you might just encounter the largely nocturnal leopard on your trek, too. If camping near a forest at night, keep your ears open for the sounds of the Himalayan Red Giant Flying Squirrel, which is nocturnal, too.

Pic. 45.

Bharal or Himalayan Blue Sheep are shy but sometimes visible

At low to mid altitudes, you might just spot a scurrying Yellow-throated Marten or the Himalayan Weasel. On the rocky hill slopes (between 400 and 4,000 m), the Himalayan Brown Goral might just offer you a glimpse. And even higher up, the Himalayan Tahr and the Bharal (Blue Sheep) might just bless you with their presence on mountain slopes.

Above 2,500 m, you might just see the cute Pikas (Royle's Pika and the Large-eared Pika). These small ground dwelling mammals can be seen in rocky grasslands near the alpine zone.

Butterflies and Moths

As one begins to climb from the foothills, many butterfly species will glide along you. Amongst the most common butterflies at lower altitudes will be the pansies (Chocolate and Lemon Pansy). The Indian Red Admiral will be also seen commonly, especially near its larval food plant, Stinging Nettle, locally referred to as *Kandali*.The Common Jester and many species of sailors can be seen along the trekking path as well.

Pic. 46.

Butterfly mud-puddling, sucking minerals from riverine soil

Amongst the most common butterflies along the track will be the white and yellow. The cabbage whites (Indian and Large Cabbage White, which lay eggs on cabbage and mustard will be seen all the way up to 4,000 m. Amongst the yellows, the Grass Yellows will be seen at low to mid altitudes, while the Clouded Yellows (Dark and Pale Clouded Yellow) will be seen at higher altitudes, all the way up to the alpine meadows.

Small blue butterflies, called the hedge blues will be spotted on bushes all the way up to 3,000 m. On and near Sorrel, will be the Sorrell Sapphire, possibly the most common butterfly of the Blues family at low to mid-altitudes. At higher altitudes, above 1,500 m, the coppers (Common Copper; White-bordered Copper) and the sapphires (Powdery Green Sapphire, Azure Sapphire) will be spotted.

The punches and judies (metalmarks) will make their appearance along the trekking path. The common Punch, seen only in the Western Himalayas, the Dark Judy and the Tailed and Lesser Punches are the most commonly seen metalmark butterflies.

The swallowtail butterflies, amongst the prettiest of butterflies, the Common Peacock, the Spangle and the Common Mormon can often be seen mud-puddling at damp spots on warm days. On roadside flowers, you might spot the Common Yellow Swallowtail, while Uttarakhand's largest butterfly, the Golden Birdwing might just be spotted on flowering trees, such as the Horse Chestnut.

Above the tree line, and in Alpine meadows, the Indian Tortoiseshell, the Clouded Yellows and the Tropical Queen Fritillary are the most common species. Even higher up, as one begins to trek up to Gaumukh, one might just spot the elusive Apollos (Red Apollo, Blue Apollo).

Flora

In the lower reaches, the exposed riverbed and the islands between active water channels are dominated by trees of thorny Khair (Acacia catechu), sparse Shisham (Dalbergia sissoo), and

short-statured Ber (Zizyphus mauritiana), peppered with tall Semal (Bombax ceiba). The banks lining the water channels have a lot of Gutel (Trewia nudiflora) and Jamun (Syzygium cuminii) with beds of tall Kansa (Saccharum spontaneum) grasses and Patera reeds (Typha elephantina).

As the trail follows the Ganga, mixed broadleaved forest dominates frequently interrupted by patches of bamboo (Dendrocalamus strictus). One can see the Mandara or Indian Coral (Erythrina indica) in brilliant scarlet bloom in late spring. At places where the soil is shallow or the terrain too steep there grow cactus-like Euphorbia and Rambans (Agave sislana). The vegetation largely continues to be mixed-broadleaved, not very different from the plains, until one arrives at Uttarakashi. In Uttarkashi one starts noticing knolls of Chir pines (Pinus roxburghii). The slopes have lots of shrubs of Dhauli (Woodfordia fruticosa), whose nectar-rich red flowers are teeming with birds and insects during the spring season. The Himalayan mimosa (Mimosa himalayana) occurs all along the way, with its feathered leaves and powder-puff like pink blooms.

The changes in vegetation are more dramatic as the elevation begins to rise beyond Gangotri. The hitherto tropical character of vegetation attains a more temperate nature. Banj oak (Quercus leucotrichophora) and Burans (Rhododendron arboreum) form the main trees, along with Kaphal (Myrica esculenta) trees in the understorey. In open areas along villages you will see mauve flowers on Indigofera shrubs.

Pic. 47. Bhojpatra or Himalayan Birch trees

As you ascend beyond Harsil, Deodar (Cedrus deodara) appears on cooler slopes. Under the shade grow clumps of Ringal (Arundinaria falcata) – the delicate hill bamboo. Along the way you will find thorny shrubs of Hissar (Rubus ellipticus), laden with delicious yellow berries during summer. The grassy edges of the paths abound with wild daisy (Aster) while the sheer rock faces have plants like Patharchatta (Bergenia ciliata) growing in the tiniest cracks. Hill brooks are lined with ground orchids and Irises.

Around 2500 m you will find broad-leaved Chestnut (Aesculus indica), Moru oak (Quercus floribunda), and Himalayan maple (Acer oblongum). Still higher, the tree layer is abundant in conifers – Himalayan Fir (Abies pindrow) and Spruce (Picea smithiana), along with Thuner (Taxus baccata) in the understorey. Short of the treeline there are Bhojpatra (Betula utilis) trees – their bark peeling in paper-like sheafs. At higher altitudes as you begin your trek to Gaumukh, the vegetation is distinctly alpine. The trees thin out and you enter the bugyals (meadows) that are punctuated with short-statured Rhododendron shrubbery, Rhubarbs, typical of areas that remain snowbound through much of the year. Beyond are the glacial fields with forests of Rhododendron interspersed with sparse bushes.

Fredrick Wilson, the Raja of Harsil

One can begin to retrace Pahadi Wilson's journey from the heart of Dehra Dun at St. Thomas Church. The church, the oldest garrison church of North India, which stands with beautiful Gothic architecture on the Rajpur Road, once witnessed one of the most important events of Wilson's life. Fredrick 'Pahadi' Wilson was a mercenary, a soldier of fortune. He deserted the British armies during and escaped to the mountains near Gangotri. In due course, he became a wealthy contractor of forest timber. He lived a life of adventure and intrigue, living in the remote hills, but also hankering after the joys of city life in Dehra Dun and Mussoorie, in the constant fear of being found out as a deserter.

Wilson first married Raimatta and then Gulabi, both from Village Mukhba in Uttarkashi, performing village rituals in the 1840s. While respected for his wealth, Wilson wanted more social recognition and he sought to legalize his marriage with the Mukhba girl, Gulabi, according to English custom too. It is at this Church in 1874 that Gulabi was baptized in a private ceremony and took on the name Ruth. However, neither she nor her husband used this name, sticking always to Gulabi. The next year, in 1875, on January 8, Gulabi and Frederick Wilson were married here, with the bride listed as a spinster of forty-four years and the groom as a fifty-seven-year-old gentleman.

Close by is Astley Hall, a property reminiscent of the prosperity of Frederick Wilson. A two storied building, Astley Hall has remained an up-market shopping complex. Wilson acquired it in 1847 from Miss Elspeth Astley, the spinster daughter of a retired colonel who had served under General Lake. Behind it was a large bungalow, equipped with all modern comforts, making it the perfect residence for the Wilsons.

Wilson moved his family from Harsil to the bungalow near Astley Hall during the revolt of 1857 in order to ensure their security. Gulabi moved from Harsil with two of her three sons. It was also at Astley Hall that Wilson kept receiving important news about the progress of the revolt leaders like Nana Saheb, from local informers. It was at Dehra Dun that his first wife, Raimatta's younger brother, Subdhyanu was educated. Subdhyanu was initially suspicious of Wilson but soon began to admire him and it was Wilson who sent him to college in Dehra Dun.

Pic. 48.

Wilson's One Rupee

One may drive for about 30 kms to Mussoorie, the hill station founded in 1823 by Major Frederick Young, a friend of Wilson. It is at the Himalaya Club in Kulri that Wilson often interacted with fellow

soldiers over drinks and dinner but always under a cloud of fear. It was on one such night when the three Fredericks—Frederick Wilson, District Superintendent Frederick O' Wells and Major Frederick Young—were sharing a conversation at the Himalaya Club, that Wilson almost got caught. Introducing himself as the nephew of one Reverend Wilson of Calcutta, Frederick Wilson thought he had managed a narrow escape when O' Wells recalled that the Reverend, in fact, had no descendants. Suspicious, O'Wells stalked him to the Camel's Back Road, and soon both got into a scuffle where O' Wells was accidentally pushed down a deep gorge and died. The deserter had also now,
Pic.20. The Wilson Rupee

become a murderer. It was after this that Wilson escaped from Mussoorie to Uttarkashi via Suwakholi and Chamba. Later, Wilson also had to once bring his first wife, Raimatta, to a doctor at Landour and he had to travel incognito in the guise of a native villager with side-whiskers and kohl, to avoid getting caught.

A walk up the steep path on one's right from Kulri transports one to the serenity of Landour. It was at Landour that Wilson purchased a house for his second wife Gulabi, naming it Ivanhoe. The house still stands at Landour. Rokeby Manor was also his residence for a significant period. Purchased in the 1850s, Rokeby Manor was named after Sir Walter Scott's romantic poem. In 1859, Pahadi Wilson suffered his first attack of gout and retired to Rokeby for a few months with his family. His youngest son, Henry, preferred Rokeby to all his other homes since he could sit in silence besides his father and gaze at the fireplace. Henry was baptized at the Saint Paul's Church close to Rokeby and a huge celebration followed. It was also at this church that Wilson's second son Charlie, married an English woman named Clara, with whom he had one daughter. He was the only son of Wilson to have married and it is believed that Wilson wanted him to rather marry a local girl.

A two-hour drive from Landour takes one to Suwakholi, a stopover on the route to Dhanaulti. It was on this road that Wilson often took between Dehra Dun, Mussoorie and Uttarkashi. Wilson and his first wife Raimatta stayed at Suwakholi. In Dehra Dun, after getting Raimatta checked by a doctor at Landour, who confirmed that the beautiful girl would never be able to conceive. The doctor confided in Wilson that this was the first such case she had seen in twenty years of medical practice. The journey between Mussoorie and Harsil, via Suwakholi and Chamba, took 11 days on foot in the 1880s. It was also on one such journey between Dehra Dun and Harsil that Wilson complained about the shortness of breath and had to be carried by chair to the top of the ridge and further to Landour. He arrived in the middle of a great storm and complained of severe chest pain, an attack that proved fatal a few days later in 1883.

The drive from Suwakholi to Uttarkashi is about 90 kms and takes one through breath taking forests. Wilson built guesthouses at Uttarkashi and Bhatwari, both of which do not survive today. He introduced cash economy to this region minting his own coins, which intrigued the local people. It was at Harsil, about 70 kms from Uttarkashi, and neighboring Mukhba that Wilson spent most of his life. While on a hunting expedition here, the priests at the Someshwar Temple of Mukhba wished to know his intentions. Not very convinced, the chief priest Kamlesh Semwal kept a strict eye on him. When Wilson requested to be led till Nelong and Gangotri to catch two Russian spies that he suspected might have used the same route, the Mukhba village council appointed Mungetu Chand to do the job. Mungetu and he struck a friendship and subsequently, he married Mungetu's 13-year-old daughter Raimatta Chand. Raimatta and Wilson lost three of their babies in her womb and Raimatta was soon declared medically unfit to bear a child. It is for this reason that she lived separately from her husband and did not accompany him like his second wife, Gulabi, to Dehra Dun. A visit to the Raimatta House at Mukhba, is a journey into her life. It is said that Wilson loved his first wife and gifted her a copy of the Holy Bible in Urdu, which until today lies in the custody of Prem Chand and his successors, the descendants of the Chand family. Adorned with a long wooden corridor Raimatta's is one of the biggest, gable-roofed houses in Mukhba. It is decorated with splendid arches very typical of architecture in the hills. Subsequently, Raimatta took over the care of Wilson's first son Nathaniel, born of Gulabi, who was a neglected child and unlike his brothers, stayed

away from his father. Whenever the villagers had any complaints about the behaviour of Nathaniel, who stayed with Raimatta at Harsil, they would complain to her for they knew that the young boy would listen to no one else but her. Raimatta was famed for making tasty buckwheat cakes which Wilson missed the most while on his journeys outside Harsil.

Pic. 49.
Wilson's Bridge over the Bhagirathi
(Source: Robert Hutchison, Garden of Fools)

Wilson's second wife Gulabi was Mungetu's sister and Raimatta's aunt who was made to marry Wilson to bear him children. The couple soon became inseparable partners, in life as in business also and Gulabi learnt not only English from Major Young but also English customs. It is said that her palanquin was one of the richest in Mussoorie and would be an object of envy whenever she arrived from Harsil.

Harsil gets its name from Hari Sila or Rock of the Gods. It was named so by Lord Vishnu. "As soon as I arrived at Harsil, I could feel it was a special place; one of the most remarkable I've visited in India", said Frederick Pahadi Wilson of Harsil. It had been Wilson's dream to build a house for himself at Harsil and by the end of 1843, his forest mansion was ready. It had ten gables and a covered veranda supported by ten handsomely sculpted lotus columns running the entire length of the front façade. The massive double entrances, each four feet in width, were made from a single Deodar. The ground floor, in keeping with practice in the mountains, contained storerooms while the first floor contained living quarters. A tiled cookhouse was a part of the mansion, the first in Tanganore. Wilson later added a granary, bakery and water mill for grinding grain. The post office at Harsil reminds one of the times in which the Raja ruled over this area.

The 1840s and 1850s was a time of railway establishment and expansion across India and it is this opportunity that Wilson grabbed. An astute businessman, Wilson proposed to the Raja of Tehri, Sudarshan Shah, to lease out the forests of Garhwal to him for timber. Not suspecting any foul play, the king agreed and this marked the beginning of the rise and rise of Wilson. Wilson had one crew for felling the Sals and Chir pines, another of cutters trimming them and a third using bullocks to remove the stumps from the flattest patches of timbered land so that the local farmers could prepare the soil for cultivation. He planned a chain of observation posts, campsites and forest bungalows at every 10 miles along the river from Dharasu to Harsil. This system, called the Das-Mila system (Das Mil or ten miles), worked well. Wilson had over a thousand workers on the payroll—sawmen, axmen, guards and in order to keep finances under control, he wanted to mint brass rupee coins. Consequently, he ordered a foundry at Saharanpur for

1,00,000 brass rupees. The obverse of the coin bore the inscription F. Wilson - Harsil - One Rupee, and the reverse side had a filigree motif. A hole enabled him to string the brass rupees together in a wire.

One can drive from Harsil for a distance of 11 kms to reach Lanka, the last stop before the turn to Nelong Valley. In a gorge beneath Lanka, Jadganga, a rapidly flowing river that descends from the mountains bordering Tibet, joins the Bhagirathi. It was while camping in the nearby Bhaironghati that Wilson realized the need for a bridge to cross the gorge. He got a bridge constructed here.

A turn from Lanka leads into the Nelong Valley, a valley bordering Himachal Pradesh and Tibet. Home to several Jad traders who traded salt and wool across the borders, the denizens of the valley had to be evacuated after the Indo-China War of 1962. It was in this valley that Wilson chased two Russian spies and hunted them down, besides making diplomatic efforts to keep Prince Waldemar of Prussia away from this region. He realized the importance of Nelang early on and kept a close watch on any visitors from and to that area.

In 1844, a rupture in the Nelong Glacier caused one of the bridges built by him near Jadganga to collapse. He then decided to build the bridge spanning the top of the Jadganga Gorge. It was when he achieved the construction of this bridge, that the headman of Mukhba gave him the epithet, Pahadi.

Pic. 50.

The post office at Harsil, established in Pahadi Wilson's time

The next generation of the Wilsons quickly ran through the family fortunes. It is believed that during one visit to the temple of Lord Someshwar of Mukhba, he refused to pay heed to the pronouncements of oracle of Someshwar Devta, to spare a particular patch of the forest. The deity, in turn, cursed him that his wealth and fame would soon be destroyed. Soon, his eldest son Nathaniel, known as Natthu in Harsil, seems to have lost his mind. He began to charge tax from shepherds who would come to graze at Harsil. He would sit in the Wilson mansion window and keep a watch, a rifle in his lap, looking over shepherds trying to flee from their territory, without paying the tax they would charge. He would shoot indiscriminately at the sheep, if he felt the shepherds were short-changing him. Once, in the mists, he shot at what he thought was a flock. They turned out to be men, and Natthu stood accused. He was disowned by Wilson and died in Dehra Dun. His second son, Charlie, had a daughter. But the man was believed to have killed his brother, the third son, Henry. Charlie auctioned off most properties acquired by his father, including West Lynn at

Kulri in Mussoorie. Within the passing of a generation, the family had squandered the benefit of Pahadi Wilson's meteoric rise. Pahadi Wilson and Gulabi were buried at the Camel's Back cemetery.

2.14 TRADITIONAL KNOWLEDGE SYSTEMS & TRADITIONAL ECONOMIES

Bhojpatra

The Chir is a valuable tree in the region of Chirbasa while Bhojbasa has the Bhojpatra. *Bhojpatra* is the plant that was once used in place of paper, to write on. Today, one can see Bhojpatra used as logs in bridges that have been built by local authorities to cross the several streams en route. While the trek from Chirbasa to Bhojbasa has Bhojpatra Trees, the tree species is almost absent in the region of Bhojbasa itself. The region is also abundant in violet rhododendrons and the shrub *Ganga Tulsi* that has anti-bacterial properties, is used to treat wounds and is also given to people with fever. Bhojbasa also had juniper berries and the shy HimalayanBlue Sheep or Bharal whose herds flocked Bhojbasa during sunset. The route from Bhojbasa to Gaumukh is home to the brown coloured tail-less Himalayan rodent, the Pika,which resides in dark corners under the huge boulders that line the trek.

Pic. 51.

Human labour of porters and animal livestock like mules are very significant to local economies.

Traditional foods here include the delicious Arsa, a sweet prepared with jaggery. Madeduring the monsoon months of Saawan and offered to *Sheetala Devi* too, Arsa is also sometimes referred to as Anarsa. Shredded coconut or *nariyal* is also used in the traditional *prasad* offered to Goddess Ganga at Gangotri.

Apples

Wilson apples are the main horticulture produce of Mukhwa.The apples are grown in the vast apple orchards owned by different families and some by corporates too. These apples were introduced by the British to these hills in the latter half of the 19th Century, after they defeated the Gurkha ruler of Nepal. In the Garhwal division the apples were first introduced by F.E. Wilson (also known as Pahadi Wilson) in 1859 in the Harsil area of Uttarkashi district. He went on to lease the land from the King of Tehri. The regions that were given to him were Dharasu, Bhatwadi and Harsil. Wilson bought many varieties of apple from Britain in 1864 and planted them in Dharali. The local farmers then took up to planting apples and the best variety of apple

was named as Wilson Apple. Till today, the best apple from the region is known as the Wilson Apple. While the best apples are sent to markets abroad, some are plucked and washed thoroughly with water. They are then sliced into disks. A plastic sheet/cloth is spread at an area on the roof/verandah of the house which receives maximum sunlight. The sliced apple rings are then spread over the area and are sprinkled with salt to aid the process of drying. The main purpose is for them to lose their water retention and dry quickly under the sunlight. In a week, apple chips are dry and are ready to be packed or eaten directly.

Local Brews

Kacchi, the locally brewed liquor, is popular in Uttarkashi district. Kacchi is prepared using barley too, which becomes a barley based distilled beverage of the Bhotiyas. The methodology of the same is almost similar to the traditional recipe and starts with the soaking of barley seeds in water, half boiled and then left to moderately cool. After the seeds are cool, they are thoroughly mixed with a starter culture, *Balam* in an appropriate proportion. The mixture is then transferred to an earthen pot/container, which is partially air tight. The pot is then left in a dark room for the process of fermentation which takes 4-7 days. After the prescribed time has elapsed, the fermented mixture is then transferred into a distillation pot called *taula.* The *taula* is then set on fire for the process of distillation. *Jokhal*, a wood frame is then fixed above this pot which is intentionally perforated at the middle. Above this wooden frame, a copper plate referred as *paraant* is kept, which is filled with cold water. The vapors that evaporate and pass through the perforations hit the cold surface of the *paraant* and condensation takes place. The droplets are collected in the middle wooden frame. The water is regularly changed so as to keep the water cool and also because the strength of the Kacchi is dependent upon the temperature of the cool water of the *paraant*.

Balam

Balam uses wheat as a substrate and is added to the preparation of many traditional alcohols including Kacchi, Jaan etc. A traditional *balam* is prepared by washing the wheat grains in water, sun-dried and grounded to flour then roasted over fire in a pan until it attains a brown color. The flour is mixed with essential plant parts (Cinnamon, Nepal/Black Cardamom, and Indian Long Pepper and Sacred Fig seeds). To the mixture is added a required amount of water to form a paste which is left to semi-dry. This semi-dry dough is pressed into balls by palms and is left to dry in shade for it to be stored and used.

A quantity of jaggery (2-3 Kgs) is mixed with water and an amount of yeast is added to it. The container that the liquid is prepared in is left to ferment in a dark room for the time duration of 5-6 days. After the duration, once the mixture is rotten, the container is placed on fire and is left to boil. The vapor are collected on a plate placed above the pot and the droplets are collected. These collected droplets are what form the drink which is ready-to-drink. Brahmins and Pandits do not get involved in the process of preparation or consumption of the Kacchi. It is only prepared by the Nepalese and other people belonging to the lower strata. It plays a pivotal role in socio-economic lives of the villagers, especially those belonging to lower strata and in the lives of Bhotiya communities. It also gives financial support to the tribal people and is sold at the cost of Rs. 60-80 per liter.

It is usually consumed in the following utensils:
Earthen pot: A regular earthen pot shaped in the form of 'matki'. The utility of the pot is to mix the solution and for the process of fermentation.

Taula: Distillation pot placed on fire to boil the fermented mixture for the process of evaporation to take place.

Jokhal: A wooden frame with perforations in the center placed above the earthen pot during the distillation process. The perforations are made so to let the evaporating vapors pass through this frame, hit the cold surface above it and get collected in the center of the wooden frame itself.

Paraant: A plate made of copper, placed above wooden frame during the time of distillation. The plate is filled with cold water so as to aid the process of condensation. The water of the *paraant* is constantly changed as the strength of the Kacchi depends on the temperature of the water in the *paraant*.

Wool

The wool of Uttarkashi's Dunda District is one of the finest. This wool is collected by nomadic tribes who move with their flocks, as they herd them in the alpine regions. They move to the upper regions of the Himalayas during the summer. Their occupation during the summer – cultivating rajma, soyabean, potato, almonds, walnuts. Once the winter season arrives the nomadic tribe ascends the alpine mountains with their well-fed flock. The month of October – November they sheer the sheep and goats, and sell the wool in the market place. The shepherds take their sheep to flock in Bagori a high-altitude valley and descend downstream to Dunda. The market, where the wool is sold. The wool is spun with Tibetan sheep wool and carding machines are used. Small quantities of wool arecarded or spun by hand, still.

Individual weaving by families is done, hence the herd is owned by families which collect, sheer the sheep once at the start of winter, once when the winter ends and once middle of summer. The herd is brought back to the villageduring the winter. The shepherds with their flocks' roam on the same ancient herding routes. The Shauka Community are nomadic in nature, they are the only community the Tibetans want to indulge in business with. They cross the border into Tibet twice a year. Hand spun yarn is in demand till date and the Shaukas are born into this craft.

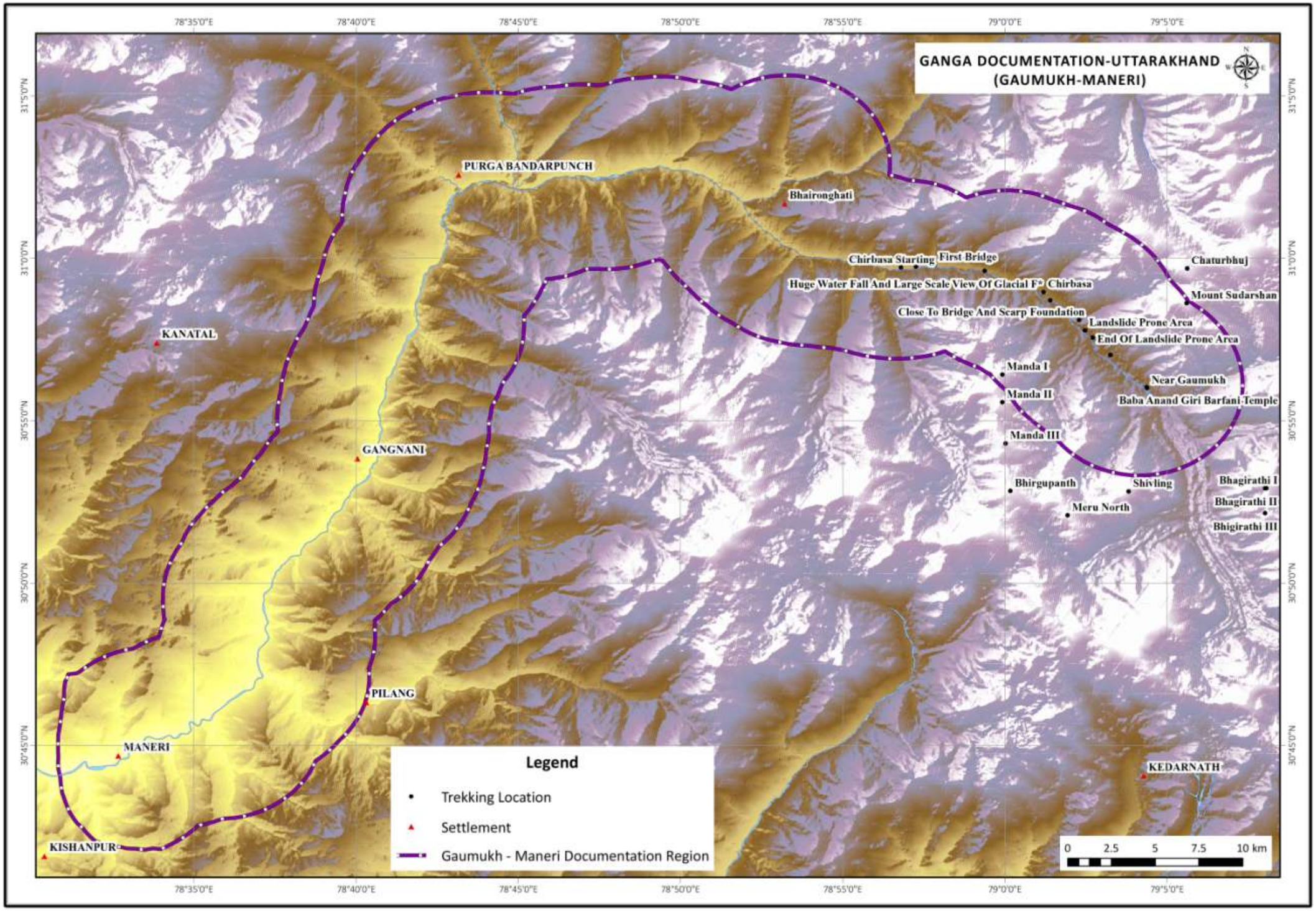
Pic. 52.

Spinning wool in Bagori Village

The wool is spun using two types of spinning tools:

Takli or Drop Spindle: This is one of the oldest forms of spindle which is carried by the nomadic community. The spinner wears the wool around the left hand while with the right hand gives the wool a clockwise twirl. The left thumb and the forefingers help pull the wool which inturn helps controlling the thickness and further twisting it. The right thumb and forefingers control the twist that run on the spindle. The spindle once full the yarn is and into a ball. This is used till date as it is a tool that is best used while on the move.

Bageshwari Charkha: This spinning wheel is operated by a foot treadle that spins the spindle, leaving the hands free to pull on the yarn. The hands are free to twist and control the thickness while the spindle is kept in motion by the foot operated treadle. This is operated by a wheel, and hence is a combination of Indian and European style. The Europeans introduced the treadle while the Indians incorporated their traditional wheel into the process. The bobbin has a U-shaped flyer suspended directly above it. Hence the spindle turns, which also turns the wire which have indents on it, these indents guide the yarn to the bobbin. The spinner has mainly to change the yarn into different indents to evenly twist in the bobbin. Thin yarns which are required to make shawls are normally spun on the Bageshwari Charkha. It is portable, hence aiding the transhumant Shaukas to carry it with them. Nonetheless, older generations continue to use the drop spindle.



Map 05 : Overview Map [Gaumukh - Maneri]

3 UTTARKASHI - ARCHITECTURAL HERITAGE

Kath Khunni Style of Architecture

The Koti Banal or Kath Khunni style of architecture reflects indigenous realities and community involvement in the mountains. It demonstrates the skill of craftsmen who have inherited building techniques and a profound knowledge of the local materials from their forefathers. The word Koti Banal comes from kothi which means huge bungalows; Banal refers to the region. These multi-storied traditional houses exhibit a distinct construction style which is almost 900 years old. Several so-called pherols, being four-storied buildings and one panchpura (meaning five floors) remain in Koti Banal. Since similar buildings can be seen in other neighbouring mountainous countries, it can be theorised that the knowledge was transported via the silk route.

Pic. 53.

Typical Koti Banal buildings

The ingenuity of this region lies in the fact that local materials like wood, stone, slate and mud were used to create the structures. The primary wood used is Deodar, one of the strongest Indian conifers. It is resistant to weather rot and its natural oil repels insects. It is very durable and used in building walls, posts, beams, floor boards, window and door frames and the panelling of ladders. The stones are hauled from the quarries or hill slopes which act as a loose filler material between the wooden wall frameworks. Since stone is impermeable to moisture it is possible to develop bonded surfaces without using mortar between blocks. Stone has a high thermal efficiency due to which the interior temperature remains comfortable in harsh winter and summer seasons both. The flexibility between the wooden joinery and dry rubble masonry provides sufficient resistance to earthquake tremors. Slate is used as tiles on the roofs of traditional houses in Koti Banal. The dead weight of the slate is enough to keep it in place, stacked on top one another. Its properties include sunlight reflection, frost resistance, heat absorption and moisture resistance due to its high quartz content. Mud is used to plaster the walls, providing good insulation. A model view of the materials can be found below.

These marvellous specimens of architecture are built in the Uttarkashi region of Uttarakhand and are about 890 years old as per researchers from CBRI IIT Roorkee (SK Bhattacharya, SK Negi). As per common knowledge, these structures were built as forts to protect themselves against the Gurkha attacks in 1803 which lasted for 12 years. However, it can only be speculated if they have been used in similar

functions before and were originally built for defensive purposes. We can assume that there have been tax collectors from the local kings in many villages who might not have been on the best terms with the villagers, making the speculation quite probable.

The ground floor area was utilised as a home for animals and to store wood, pagedhu and kurju. The entrance to the upper floor, aad, had a wooden flooring known as med. This floor was used to store food, granary and vessels called manjiyu. They provided an openable ventilator (mori) so that the food was exposed to sunlight and air. The second floor (baaud) consists of the bedroom with balconies (atali) on all four sides. The head of the family (mali) would fight the Gorkhas from the atali. A wooden staircase (niseen) was built to access the first and second floors. The third floor (upper floor of the house) contained a kitchen to avoid smoke in the house. It also had an openable skylight (sumlai). The fourth floor consisted of a small attic with a balcony which was often used as a bedroom or altar for their deity. A model view of the functions of each floor can be found below.

The traditional house rests on a raised plinth of stone masonry and follows a rectangular plan. The walls are constructed using cribbage of wooden logs alternating with dressed stone blocks. Often vertical wooden sections intersect horizontal ones and rise along the middle of the walls to further stabilise the structural frame and support the upper floors. Wooden tie pins running between horizontal wooden logs on the external facade act as shear pins that prevent wall sections from buckling during seismic tremors. The projecting upper floors are typically finished in wood.

The wood used is termite resistant and deteriorates slowly even after long exposure to harsh conditions. The loose configuration of non-structural parts allows easy maintenance and repair.

3.1 PARSHURAM TEMPLE

The temple is situated in the heart of Uttarkashi market very close to famous Kashi Vishwanath temple. Two other temples Annapurna Devi and Dattatreya Mandir are next to the site. The temple of Parshurama signifies amalgamation of Shaivsim and Vaishnavism. Lord Parshurama was the sixth incarnation of Lord Vishnu and a devotee of Shiva. He was given the Parshurama Bow by Lord Shiva. Bheeshma and Karna from the Mahabharata were disciples of Parshurama. Uttarkashi is called the tapasthali of Parshurama or the place where he meditated. Uttarkashi also has the temple of sage Yamdagni, Parshuram's father.

In the year 2016, the temple was in the news when it opened its door after 400 years for the lower castes. The people struggled for more than a decade to get this reform implemented. Locals also say that a few years ago an ancient statue of Lord Vishnu was stolen from the temple sanctorum. Such theft is not an uncommon occurrence in the temples of the region.

Devotees organize special offerings on the occasion of Makar Sakranti here. Also, Akshay Tritiya is celebrated as the birth of Lord Parshurama and on the same day, the doors of the Gangotri Temple open for pilgrimage.

According to legends, sage Yamdagni and his wife Renuka were blessed with son Parshurama and given a cow named Kamadhenu, a divine animal known to fulfill all wishes. Once, a few warriors visited Rishi Yamdagni's ashram in his absence in search of food. They were surprised to see the women at the ashram demand dishes from the magical cow Kamadhenu to feed them. On witnessing the fulfillment of the demands by the cow, the warriors demanded the creature for their king Kartavirya Sahasrarjuna, but were refused. Later, they tried to take away the cow forcibly. Seeing all this, Parshurama got furious and killed the entire army of King Kartavirya Sahasrarjun. When this news reached the King's son, he got angry and killed sage Yamdagni. Finding his father's body on the ground, Parshuram was overcome with rage and pledged to wipe

out the Kshatriyas or the entire warrior caste from the face of the earth. He reincarnated twenty-one times to do the same.

Pic. 54.

Alpine wooden homes in Mukhwa village

It is believed that Parshurama practiced penance here to purge the sins of Kshatriya homicide. It is even believed that Parshurama still lives on earth and will even teach war skills to Kalki, the tenth Avatar of Vishnu who is expected to come to the earth by the end of Kalyuga.

3.2 VISHWANATH TEMPLE

The Vishwanath temple of Uttarkashi is said to have initially been built by Sage Parshuram and later by King Gangeshwar. It has a divine pillar of power or *shakti stambha*, which according to mythological beliefs, was used by the gods against demons for the *samudra manthan*, or the churning of the oceans in search for the ambrosia of immortality.There is another temple called the Shakti temple that stands in the precincts here. This has been referred as Sukh-ka-Mandir, or the temple of happiness, by Atkinson.

Pic. 55.

The trident of Vishwanath Temple

The *mahants* here are from the Puri caste of the Dashnam Sanyasi sect. They were given this responsibility by the Kings of Tehri.

A fair is organized each year on the occasion of Makar Sankranti and a day-long ceremony is held on Mahashivratri where childless couples participate in the *khada diya* ceremony to ask for a child. Magh Mela is organized on January 14th every year. The shiva *lingam* is bathed and decorated every day with fresh *dhatura* and other seasonal flowers.

Inside the complex of Vishwanath Temple is the Shakti Temple. The main attraction here is a huge and heavy *trishul* (trident), 8 m in height and 90 cms at the bottom which is believed to have been thrown at the devils by Goddess Durga. The *trishul*, is made of iron in the upper part and copper in the lower part and is revered as a form of Shakti. One feature of the *trishul* is that it cannot be moved with the entire body'sforce, but it vibrates the moment one applies pressure with the little finger.

The Vishwanath temple is a stone structure built in Nagara style of architecture. The Shakti temple is a modern building with a tin roof.

3.3 FESTIVALS

Pic. 56.

Celebrating the ritual with bathing of the palanquins

GANGA DUSSEHRA

This festival is also celebrated in other parts of the state like Haridwar and other states like Uttar Pradesh, Bihar and West Bengal.

The festival takes place during the month of May-June. It is a 10-day affair, people go and take a dip in the Gangotri stream, as well as celebrate with *arti*, earthen lamps are floated in the river as an offering, while people give for charity. It begins before sunrise and continues beyond sunset.

JYESHTHA DASHAMI TITHI

It is believed that Ganga appeared on the earth after Bhagirath completed great penance to bring her on earth. The goal being to free the souls of his ancestors. Hence during this festival people from all over the world come to take a dip in the Ganga to free themselves from the ten mortal sins that defeat the soul's attempt to break free from the unending cycle of birth and death. *Dus*refers to ten, while *-hera* implies defeat.

SELKU FESTIVAL

This is a day long festival celebrated mostly on September 14. Selku is celebrated to show gratitude to Lord Someshwar and Nanda Devi.

The Curse of Pahadi Wilson

It is believed that Raja of Harsil – Wilson was invited for this festival as he was known to be the 'son in law' of Mukhba. During this festival, Lord Someshwar had possessed the body of Wilson's servant. Lord Someshwar, through the servant, warned Wilson to not plunder the wealth of Harsil, especially the sacred forests that belonged to the deity. In his wrath for this insult, Wilson beat the servant and hence lord Someshwar cursed him. The curse said that none of his sons wouldcarry forward his legacy and his family fortunes or his lineage would soon be wiped out. Coincidentally, none of his sons survived and he died a sick and unhealthy man.

The festival is celebrated in the month of Bhadhon every year in Mukhba. People gather to sing and dance to show their gratitude to Lord Someshwar and Goddess Nanda Devi. They are believed to be the manifestation of Shiva and Parvati. Since most rituals in the Himalayas are embodied, they possess the bodies of chosen people. Once possessed, people perform seemingly unachievable feats like walking on swords, and or reciting the Sanskrit shlokas. It is a one day long fair with rituals in the name of the gods.

MAGH MELA

This is aweek-long fair that starts with a 'Kalash Yatra' from Ganga Mandir and is followed by a Rath Yatra. The Kandaar Devta of the Sangrali village inaugurates the fair by 'cutting a ribbon' before which he comes and takes a dip (*snan*) in the Bhagirathi river on the Manikarnika Ghat. There is a Pandav Nritya (dance of Pandavas) and performances by children from schools of the nearby villages. People come in their traditional attires. There are several stalls that sell a large variety of items ranging from local good quality seeds, along with stalls of organizations and a display of handmade crafts like Woolen Sweaters, glass, jute and replicas of monuments handcrafted in wood. Other than this, the fair offers large varieties of foodstuff.

MAKAR SANKRANTI

Makara Sankranti or Maghi, is a festival day in the Hindu calendar, in reference to the deity Surya. It marks the first day of sun's transit into the Makara, marking the end of the month with the winter solstice and the start of longer days. Local deities from the surrounding villages visit the temple; they all bathe in the Bhagirathi before visiting the deity. It is said that the deities once faced conflict over the right to enter the Vishwanath temple during the Makar Sankranti festival. This violence was finally resolved by the Maharaja of Tehri who fixed the days of visit for different deities. Kandar deity of Pata is the first one to visit the temple followed by Tilot Mandu and Maidanda on the very first day of the Magh. The second days witnesses the visit of Devi of Gambhir Village and on the third day, Samosu of Uprikot, Nag of Kelsu and Bankoli, Khandwari and Hun of Upper ranges of Bagdaddi Pati, Jakh of Knanwa and Nesmor Villages.

Other than these, deities from Bon and Panjyali villages were also permitted on the third day, however, there was no specific order or precedence among them for entering the temple.

According to the custom, the procession is led by Bajgi drummers and women who dance and sing all along the way. The processions first head to the Manikarnika Ghat where the deities take rest, and a bath, followed by a community bathing. People feel emotionally connected and also get possessed by the deity.

3.4 FOLK SONGS OF GARHWAL, ON THE GANGA

(Source: Dr. Anjali Capila, Socio-Cultural Images of Women in the Folk Songs of Garhwal Himalayas U.P.)

In Garhwal, the phrase 'mother nature' is no mere cliché. Every individual sees nature as his/her mother, friend and inspiration and loves it as such. The trees, the rivers, the mountains are all inextricably bonded to the life of the people; every Garhwali participates in the changes of seasons – celebrating and laughing with the blooming of flowers in the spring and crying with their withering in autumn. It is for this reason that in Garhwali folk songs one finds abundant references to the forests, rivers, mountains, birds and animals.

Women sing in praise of the natural beauty of Garhwal. The following song, sung by the women of Chamba, reflects an innate sense of pride in their land:

In our heavenly land of Uttarakhand!
Himalayan peaks are like the Brahmi Kamal
A symbol of spiritual and religious sanctity.

The Himalayan mountains laden with dense Deodar forests
The peaks of Badri and Kedar
The rivers Ganga and Jamuna,
And Gaumukh the source of river Ganga
Adorn our beautiful land

Simple people,
The abode of Sadhus
This land has been purified thus.
Pilgrims from various lands
Throng to the Himalayan shrines
The multi coloured flowers in the meadows

The snow on the high peaks
Shimmering like gold
With the sun's rays
Make this land heavenly!

The fog creeps up the hill side
playing hide and seek with the Deodar trees
The monsoon rain covers the hillside with wild flowers

This Himalayan land is beautiful!
As beautiful as the Brahmi Kamal
The Lotus amongst lotuses.

The visual images created by this song get reaffirmed when one is sitting amongst the Deodar trees, looking at the Himalayan peaks covered with snow. How true each word in the song is; how completely representative of the natural environment of Garhwal:

We are Garhwali, this is our Garhwal
These mountains are ours
This is our land of birth
Our home, our family
Our lush green fields have abundant grain
The sounds of our bangles
The sound of the sickle cutting grain
creates music, resounding in the hill side.
This is Gandhiji's beloved land
He spun yarn on a Charkha,
And gave us a Message for our lives.

In an another song the woman lucidly describes the environment in which she grows and lives:

The water is cool in the mountains,
Do not go away to a strange land my lord!
The Gods abide in this land
Do not go away to a strange land!
The fields are lush and green
The Himalayan peaks high and covered with snow
The forest is dense with tall Deodar trees
The water is cool and clean
My Lord do not go away to a strange land

The above song not only describes the natural environment, but also makes a reference to the presence of the sacred and the intense longing of the woman for her husband.

The following song describes the natural environment of Garhwal, with the socio-cultural practices prevalent in the society and their influence on the lives of the people, particularly women:

My Garhwal has beautiful forests
Groves of banana plantations
And tall Deodar trees
'Santelu' Pradhan makes money
In exchange for his daughters
And gives 'daan'
To attain salvation!

Pic. 57.
Himalayan women are resilient and their pain reflects in their folk songs.

The beauty of the land serves as a canvas against which the image of the woman of Garhwal is painted. Nature is a close friend and comforting mother with whom troubles can be shared and the burden and hardships of everyday life alleviated. The folk songs of Garhwal highlight the link between two significant aspects of the woman's life; relating her socio-cultural environment to the description of the land.

In terms of the ecology of the Garhwal Himalayas, the following songs about trees reflect the close linkages between human and natural environment:

The Rhododendron trees laden with flowers
Decorate the mountains,
Like jewels studded in a crown!

The 'kafal' fruit is ripe
Come dear friend – Let us go to the forest
To eat the fruit of the 'kafal' bush
The leaves of the Oak tree have turned green
There is water in the roots of the Oak
Come, quench your thirst!

Pluck the Rhododendron flowers
But do not break its branches
Cut the dry branches of the Oak
But do not cut it from roots!
Cut grass, but not the branches
of the Deodar trees.

Women have an inherent knowledge about the ecology of their region. Their lives are deeply linked with the forest. According to Veer Singh, "every woman in Garhwal is an eco-philosopher. She has implicit knowledge about the flora, cropping pattern and the vegetation of her region. For example, the Oak tree is known to contain water in the roots. In Manjyar village in Chamba block, the Oak forest had been protected by the combined efforts of women of three villages on the hillside. The rain water harvest tanks located here were filled with water, and women did not have to walk long distances to get water. Here one can see the relationship of the song and the actual life experiences of the women. The songs about trees reflect the women's concern about their environment, new context is added to them all the time related to issues concerning their lives."

The following song speaks about the importance of growing more trees and caring for them:

Dense forests look beautiful!
Grow more trees in the front yard and
Backyard of your house and your fields
The yield from crops will increase
Grow garlic, onion, and cumin seeds

Our land Garhwal, is the land
of Gods and Goddesses,
Keep your land beautiful
Grow more trees!

Trees give you fruit
The sound of swaying branches
Will fill you with joy!
Keep vigil around your trees

Garhwal, our land is Parvati's birthplace

From Lord Shiva's hair roots
Emerges the mighty Ganga!
Keep this sacred land beautiful
Grow more trees.

The last four lines reinforce the notion of the sacred, which permeates the very fabric of the life of the people of Garhwal. The message of growing more trees is beautifully linked to the sacred and to the natural environment. Since women go to the forest for fuel and fodder twice a day, these songs are created by them, for them:

Dear sisters, do not cut trees
If you cut trees, the soil, mud, earth
will disappear
No fields, nor houses will remain on the hillside.

Trees give us fodder for animals
Keep our environment clean; the air pure
Nurture and care for the trees
Like your own children
Look after them, raise them with care.

There is a great sense of ecological preservation in the women. They understand the value of the forest and its relationship to their lives. These songs are sung by women when they are in the forest, or when they get together in groups at their Mahila Mandal meetings. Ecological awareness and preservation of the forest is not only a concern of the power elite who give a voice to these issues at seminars and conferences. It is very much a day to day concern of the women of Garhwal. They create songs to express these issues, and this simple form of communication has tremendous impact on the community:

Do not cut trees
Protect them!
Trees keep the mud intact on the hillside
The mountains look beautiful with dense forests
Even the seasons are dependent on trees
The rivers Ganga and Yamuna are dependent,
On the trees of the Himalayas.
The life of animals is linked to trees
Do not cut trees
Protect them!

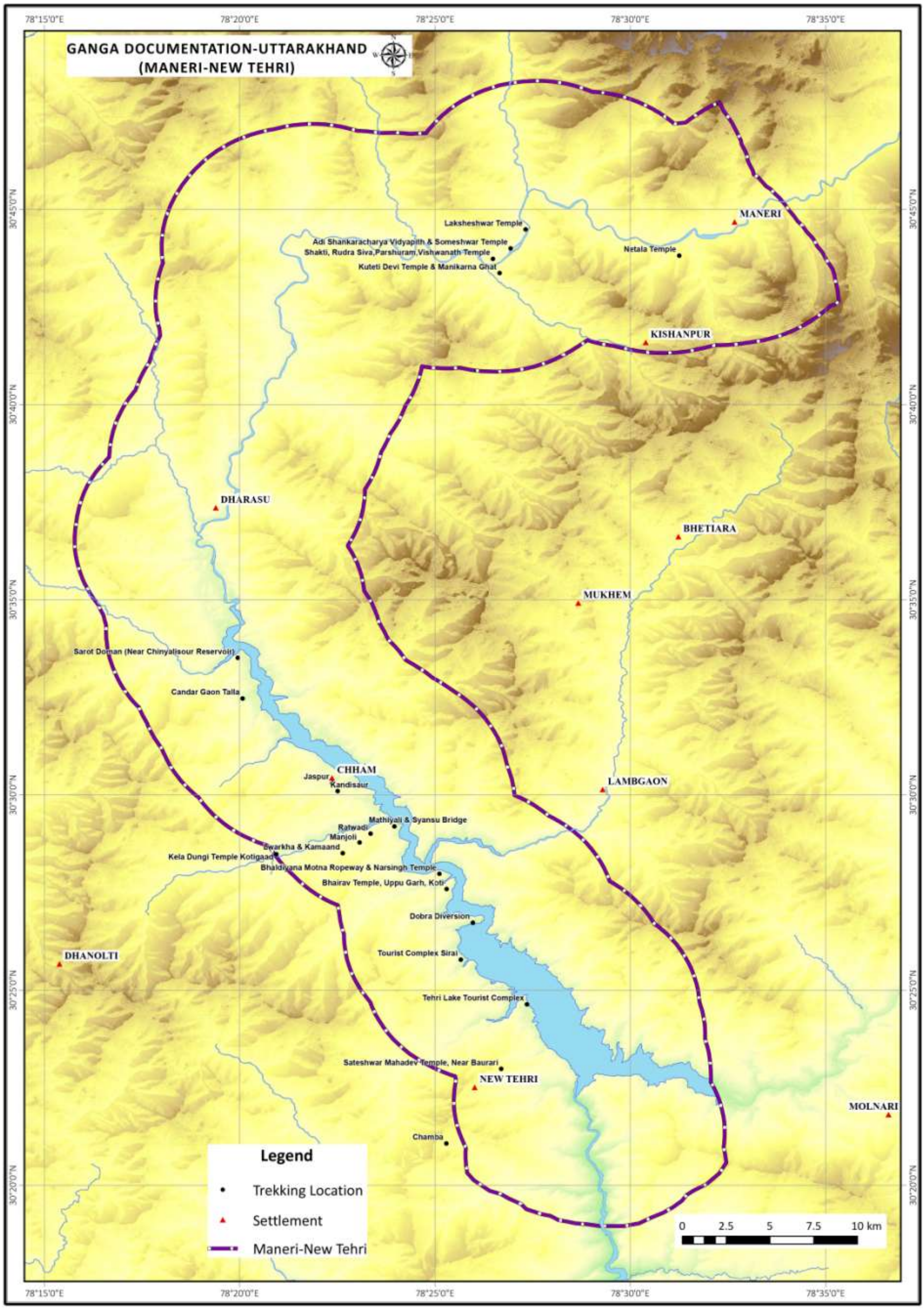
At an environment camp at Buda Kedar organized by the NGO – Lok Jeevan Vikas Bharati, 300 men and women representing 11 NGOs from Tehri Garhwal gathered to express their ideas and concern about environmental issues. Surja Devi, head of the Mahila Mandal of village Buda Kedar, said, "we are made of mud, with mud we have a deep relationship. We have knowledge about every tree, fruit and leaf in our environment. Our lives and our songs are deeply linked to them".

The following song describes the beauty of the wild berries growing in the forest. When women go to collect fodder and fuel-wood, they eat these berries and quench their thirst :

Your black skirt
And your beautiful golden yellow blouse
makes you look so beautiful dear 'Hissar' (berry)
I cannot find words to describe your beauty.
You quench the thirst of people
by the juice of your fruit
Other fruits and berries in the forest
cannot match your beauty!

You beckon people to come near you,
From far and near
Dear Hissar you are indeed special
I cannot find words to describe your beauty.

The relationship of the women of Garhwal with each and every bush in the forest is special. About four to five hours in a day are spent in the forest with friends. These songs are composed and sung by the women to express this relationship and a sense of oneness.



Map 06 : Overview Map [Maneri - New Tehri]

4 HARIYALI DEVI SACRED LANDSCAPE

4.1 INTRODUCTION

Hariyali Devi sacred landscape of Garhwal Himalaya is perhaps the best-known example of a site's sacredness leading to its conservation. The Hariyali Devi forest falls under the jurisdiction of the Forest Department, having the status of reserve forest. Hariyali Devi is situated at an altitude of 1500–2800 m above msl at 30°19'48.18"N, 79°00'24.77"E. The landscape is dedicated to the deity Hariyali Devi and that plays a major role in conserving the biodiversity of this forest. Taboos, rituals and socio-cultural practices are associated with conservation practices.

Hariyali Devi is located above Kodima village at an altitude of 1400 m in Rudraprayag. The temple contains a bejeweled idol of Ma Hariyali Devi astride a lion. The temple houses chiefly three idols, namely, Ma Hariyali Devi, Kshetrapal, and Heet Devi. The temple is open throughout the year, but it is more festive at the time of Janmashtami, Navratri, and Deepawali.

Pic. 58.

Rhododendron (Burans in full bloom in Hariyali Devi Landscape)

GEOGRAPHY

Hariyali Devi Landscape (30°13 to 39°19'N and 79°79 to 7'E), lying between 1500 and 2800m above msl in Garhwal region of the Central Himalaya is situated above Kodima Village, at a distance of 32 km from the nearest town, Gauchar on the route to Badrinath Shrine, NH no. 58 in the Chamoli District of Uttarakhand.

The sacred natural landscape area of 5.5 km^2 experiences three seasons:

(i) Summer (March-June) with maximum and minimum temperature of 32.3°C and 18.3°C,
(ii) Monsoon (July to October) with maximum and minimum air temperature of 29.3°C and 20.8°C, respectively and
(iii) Winter (November to February) with maximum and minimum air temperature of 24.9°C and 13.2°C.

BIODIVERSITY

The Hariyali Devi sacred natural landscape preserves 98 plant species, representing 88 genera and 46 families with different economic value. The dominant family is Rosaceae, which recorded the highest (10) number of species. Out of 98 plant species the dominant life form contribution was of herbs (52), shrubs (26) and tree species (21). Almost 82 plant species in the landscape are of medicinal importance, 15 species are used for timber and construction purposes, 19 species with different edible plant parts, such as fruits, flowers, seeds and rhizomes.

The predominant vegetation is Quercus semecarpifolia, Quercus leucotrichophora, Rhododendron arboretum and Lyonia ovalifolia. Rituals, taboo and folklore are associated traditionally through cultural beliefs, leading to sustainable utilization of resources.

List of Tree species (with ethno-medicinal properties) found in Hariyali Devi Sacred Natural Landscape:

Botanical name	*Vernacular name*	*Family*	*Ethnomedicinal property*
1. Ilex dipyrena Wall.	Kandara	Aquifoliaceae	Agriculture implements, fuel, fodder
2. AlnusnepalensisD.Don	Utees	Betulaceae	Fuel, soil binder
3. Betula alnoides Buch.-Ham. ex D.Don	Bhojpatra	Betulaceae	Wood, fodder, medicine (rheumatism)
4. Benthamidiacapitata (Wall.) H. Hara	Bhamora	Cornaceae	Edible (fruit), wood/timber
5. Cupressus torulosaD.Don ex Lamb.	Surai	Cupressaceae Wood	Medicine (cough, cold, and bronchitis)
6. Lyonia ovalifolia (Wall.) Drude	Anyar	Ericaceae	Fuel, medicine (wounds and boils)
7. Rhododendron arboreum Sm.	Burans	Ericaceae	Fuel, edible flowers, medicinal (headache, diarrhea, and dysentery)
8. Quercus floribunda Lind. ex A. Camus	Tilonj	Fagaceae	Timber, fodder, fuel
9. Quercus leucotrichophora A. Camus	Banj	Fagaceae	Timber, fodder, fuel
10. Quercus semecarpifolia Sm.	Kharsu	Fagaceae	Fuel/timber and fodder
11. Aesculus indica (Wall. ex Cambess.)	Pangar	Hippocastanaceae	Fuel, fodder, medicine (rheumatism)

Hook.			
12. Juglans regia L.	Akhrot	Juglandaceae	Edible fruit, dye, medicine (antiseptic, astringent)
13. Lindera pulcherrima (Nees) Hook. f.	Cheri	Lauraceae	Wood/fuel, manure
14. Perseagamblei (King ex Hook. f.) Kosterm.	Kauwla	Lauraceae	Agricultural implements/fuel
15. Myrica esculenta Buch.-Ham. ex D.Don	Kaphal	Myricaceae	Edible fruit, medicine (cough, fever, and asthma)
16. Abiesspectabilis (D.Don)	Morinda	Pinaceae	Timber/fuel, medicine (fever and antiseptic)
17. SpachPiceasmithiana (Wall.) Boiss.	Rai, spruce	Pinaceae	Wood/timber, medicine (cuts and sores)
18. Pinus wallichiana A. B Jacks.	Kail	Pinaceae	Fuel, paint, medicine (antiseptic)
19. Prunus cornuta (Wall. ex Royle) Steud.	Jamma	Rosaceae	Fuel, fodder, medicine (antipyretic)
20. Pyrus pashia Buch-Ham. ex D.Don	Mehal	Rosaceae	Fuel, fodder, edible, medicine (diabetes)

Hariyali Devi forest harbors many sacred animal and butterfly species. Capricornissumatraensis, Cervus unicolor, and Felisbengalensis are some common mammalian species. In addition to these, some reptile species were also recorded from this sacred natural landscape.

List of Sacred Animal Species (With IUCN Conservation Status) found in Hariyali Devi:

Scientific Name	***Common name***	***Family***	***IUCN status***
1. Aonyxcinerea	Asian small-clawed otter	Mustelidae	Vulnerable
2. Capricornissumatraensis	Serow	Bovidae	Vulnerable
3. Cervus unicolor	Sambar (jado)	Cervidae	Vulnerable
4. Felisbengalensis	Leopard cat	Felidae	Least concern
5. Felischaus	Jungle cat	Felidae	Least concern
6. Hemitragusjemlahicus	Himalayan tahr	Bovidae	Near threatened
7. Martes flavigula	Himalayan marten (khursyala)	Mustelidae	Least concern
8. Panthera pardus	African leopard	Felidae	Vulnerable
9. Panthera uncia	Leopard (guldar)	Felidae	Endangered
10. Rattus	Himalayan field rat	Muridae	Least concern
11. Sus scrofanitidus	Wild boar	Suidae	Least concern
12. Ursusarctos	Brown bear	Ursidae	Least concern

Sacred Natural Landscapes are associated with religious rites, festivals, and recreation. The organization and celebration of fairs and festivals have preserved the traditional and socio-cultural heritage of Garhwal to a great extent. In Hariyali Devi, festivals are organized during April and

October every year on the occasion of Navratri, Shivratri, Holi, and so forth. At these festivals, local communities reaffirm their commitment to the forest and the deity. The heads of the communities supervise the utilization and maintenance of the sacred natural landscape to ensure that there is no deviation from the village-appointed rules. Many plant species have also been associated with religious festivals, namely, Azadirachtaindica (Sheela Asthami, Nimb Saptami), Ficusbengalensis (Vat Savitri), Aegle marmelos (Bilvamengalsawankesomvaar), Musa paradisiaca (KadiiVrat), and Ficus religiosa (Somvati Amavasya), due to popular and common beliefs.

MYTHS & LEGENDS

According to Bhagwat Puran, Yogmaya was the sister of Krishna, and she replaced him in the cell of his parents when Kansa threw her against the wall.

She turned into lightening and came to Hari Parvat (Hariyali is a Sanskrit word, which means green all around and *parvat* means mountain) to make her abode. Since then she came to be known as Hariyali Devi and the adjoining forest is called Hariyali.

According to another similar myth narrated, when Devi Mahamaya was conceived in the form of Devaki's seventh child, the cruel brother of Devaki, Kansa threw Devi Mahamaya aggressively on the ground. Immediately, multiple body parts of Devi got scattered all over the earth. The hand fell at Hariyali Devi. Since then, it has become a revered place, a Siddha Peeth. The temple is open for all seasons but it is more celebratory at the time of Janmashtami, Navratri, and Deepawali. The myth which prevails according to the Bhagwat Puran is the following: Yogmaya was the sister of Lord Krishna, and she replaced him in the cell of his parents during his birth. When Kansa threw her against the wall, she turned into lightening and came to HariyaliParvat to make her abode. Since then, the adjoining forest is known as Hariyali and is worshipped by people.

There are taboos associated with the Hariyali Devi sacred natural landscape. According to villagers, these taboos need to be followed by all. On the face, they may appear regressive, but have contributed a great deal in preserving the forest. These include the following:

(a) Women are strictly prohibited from entering the sacred forest due to the belief that they are impure.

(b) Fetching/collection of fodder and fuel wood and the movement of women and *shudras* (scheduled castes) have been strictly prohibited in this grove since the Mahabharata period. A temple of the goddess Hariyali Devi is located in this forest patch.

(c) Use of tools in any form (knife, sickle, etc.) on the plants and animals will be a step to hurt the sentiments of Devi (goddess). The forest fairies in turn are angered and their wrath can make person mad or deformed and also can lead to disaster in the family of offender.

(d) For a person who starts his journey, if a snake comes across his way, then he has to stop the journey and has to restart only after worshipping the god after an interval of a week.

(e) One week before pilgrimage, the villagers stop eating onion, garlic, egg, and meat.

(f) Anything that is made up of leather is prohibited in the temple and grove.

(g) Killing/hunting of animals and plucking/uprooting of plants are strictly forbidden in the sacred natural landscape.

(h) Institution of Mrigoli is practiced in Hariyali Devi Sacred Natural Landscape and forbids hunting of pregnant does (female deer).

Another taboo relates to the precise regulation of coppicing of the major fodder species, that is, Banj (Quercus leucotrichophora), and the collection of the litter mass from the forests. Additionally, the Van Panchayat (village Forest Council) regularly monitors the grazing pressure and the state of the pasture to make decisions about rotating or relocating herds or even downsizing the size of the grazing herd. Yet, other very effective means of lessening the intensity of resource use from the sacred natural landscape are strict adherence to certain norms, viz., partaking measures not to eat meat, drink liquor, even certain completely prohibited eatables, such as onion, garlic (the two most commonly referred abhorred items), for a minimum of one week, before one makes a pilgrimage to the sacred natural landscape; the three months prohibitory period extended to each of clan members, when a death occurs in a family; and restricted days of hunting. There is a strict norm of walking bare feet, promulgated during the annual Jaats (pilgrimage) traversing through the sacred natural landscape, viz., during the Nanda Ashtami Festival, when sacred Brahma Kamal (Saussureaobvallata) collection is carried out. Wearing shoes is a taboo. Obvious connotation to the significance of the practice towards conservation of the flora could be made, since bare feet are less damaging than shoes.

The Devi is a Bala Sundari, generally refrred to as Tripuri BalaSundari, for she is related to the trinity of the Hindu gods. She is bala because she is a little girl, for whom three temples have been constructed on three different hill tops in the landscape. The myth widely believed is that a cow from the adjoining village named Pavo, would suddenly vanish at night. One night the owner followed the animal to find her lactating over a stone. Rituals of worship over the stine were prescribed by the goddess since then.

The worship is the responsibility of Maithani Brahmins (and also sometimes Chamoli Brahmins in the absence of the former), from the Village Jasholi.

A small temple exists in the sacred natural landscape. Other than that, there is no architecture of note.

SACRED GEOGRAPHY

The inhabitants of Uttarakhand state are still dependent on traditional *Vaidyas* (practitioners of Ayurveda) for treating diseases, due to isolation and the relatively poor access to modern medical facilities. Different parts of plants, such as leaves, stems and fruits are used for different medicinal purposes. Making a mixture of different plant parts cures a large number of diseases. However, people do not depend on the medicinal plants too much, as they do not have too much knowledge. Other resources, as the collection of fodder, fuel, vegetables and material for agricultural purposes are a daily routine for the villagers.

Some tree species, important in Argo forestry and social forestry programs, are also present in the landscape.

PROBLEMS & PROSPECTS

The present study revealed that the Hariyali landscape can be considered a model of in situ conservation of biodiversity and can be a possible candidate for the selection of a biodiversity heritage site in Uttarakhand. Biodiversity sustains all life processes and contributes directly to human wellbeing, by supporting the production of food, fuel, fiber and genetic material. In general, however, it is widely believed that the loss of biodiversity and ecosystem degradation jeopardizes human wellbeing, both now and in the future. The villagers protect the landscape out of fear of a deity and due to the presence of traditionally used plant materials from the forest, which are also economically important and a good reason for the conservation of biodiversity for the future. Illegal felling of plants, the prohibition of weapons and of hunting out of fear of a deity in this forest, also nurtures animals, such as deer, the Himalayan bear, leopard and porcupines etc. However, the key for further success towards a future conservation of religiously preserved patches, under the present threats and circumstances, lies in the education of locals, of planners and political managers, on the significance of such sacred areas.

Lack of awareness in terms of long-term future benefits has resulted in the destruction of sacred natural landscapes. No legislative protection has been implemented so far in India. This has caused considerable ecological damage. Sacred groves have become the victims of deteriorating faith. Such religiously protected areas provide a comprehensive and rich ecological niche as repositories of genetic diversity. The increased threats to sacred natural landscapes can be related to the lack of an in-built conservation effort, higher demands for NTFP (non-timber forest produce), fuel wood collection, and decrease in the religious faiths along with the reduced commitment of the present generation toward such natural sacred places.

Encroachments of sacred natural landscapes by various government departments for different developmental projects, as well as migration and immigration of people, also have contributed to the extinction of sacred natural landscapes. These sacred natural landscapes need to be protected and managed wisely as was done a few decades ago. For providing necessary protection to the sacred natural landscapes and maintaining their natural identity and sanctity, it is imperative that the surrounding population is taken into confidence. The surrounding village communities need to be educated and guided for sustaining the sanctity of existing groves and strengthening them. Conservation of sacred natural landscapes is impossible without the active participation of the local people. Conservation without compensation is only conversation. By improving their living standards and by giving benefits of conservation to them, long-term conservation goals in these sacred natural landscapes can be achieved.

Pic. 59.
Fyonli is a locally revered flower

4.2 TUNGNATH

INTRODUCTION

Tunganath is a sacred spot situated 3000–4000m above msl at 30°29'13.07"N and 79°13'16.16"E. Tungnath lies in the upper catchment of the Alaknanda River and the Mandakini River, two major tributaries of the Ganges at an altitude of about 2800–3300 m. Tungnath temple is dedicated to Lord Shiva and is the highest Shiva shrine among the Panch Kedar, 3 km uphill form Chopta.

Pic. 60.

The sacred temple of Tunganath, above the tree line.

Conservation of nature and natural resources has been an important part of cultural ethos, especially in remote rural and indigenous communities in many parts of the world, including India. These communities consider themselves connected with their biophysical environment in a web of spiritual relationship. These rural communities consider specific plants, animals, or even rivers and

mountains as their ancestors and protect them. In India, nature worship dates back to the pre-Vedic period (5000 B.C.) and is based on the proposition that all creations of nature have to be protected. The forefathers of these communities were fully aware of the importance and significance of natural resources and the necessity of their conservation for the sustenance of future generations. They lived in harmony with nature and thereby played an important role in conservation of biodiversity. One of the important traditions of nature reverence is to conserve those patches of forest that have been dedicated to a god or goddess or ancestral spirits as sacred groves.

GEOGRAPHY

The rocks of the area are mainly mylonitized gneisses, augen gneisses, schists, and granites constituting Munsiyari Formation. The weathering bedrocks, which provide the bulk of the loose material in these mountains, are crystalline and metamorphic, with sedimentary deposits of Paleozoic age. The soil texture is sandy loam, light grey to brown in color and acidic in nature, with a pH range between 4 and 5.

Four distinct seasons are observed in the study area: short summer (May-June), Monsoon (July–mid-September), autumn (mid-September-October), and long winter (November–April). The snow cover lasts for about 4-5 months and melts during April–May, which marks the arrival of favorable conditions for plant growth. The growth period lasts for about 5–7 months only.

BIODIVERSITY

Apart from being a sacred grove, Tungnath is also a part of Kedarnath Wildlife Sanctuary and hence is an important region as far as the conservation of biodiversity is concerned. Tungnath is a home to many rare, threatened, and endangered medicinal plants like Picrorhizakurroa and Nardostachysjatamansi.Total of 27 plant species were reported from this sacred natural landscape, which include 8 trees, 10 herbs, and 9 shrubs. Some endangered animals like musk deer, black bear, and so forth are also found there in good numbers. Many rare and threatened birds and reptiles are also found there.

List of Tree species (with ethnomedicinal properties) found in Tungnath Sacred Natural Landscape:

Botanical name	Vernacular name	Family	Ethnomedicinal property
1. Acer caesium Wall. ex Brandis	Indian maple	Aceraceae	Fuel, medicinal (for muscular swelling)
2. Ilex dipyrena Wall.	Himalayan holly	Aquifoliaceae	Fuel, fodder, agricultural implements
3. Betula utilisD.Don	Bhojpatra	Betulaceae	Medicinal (diuretic, skin infections)
4. Euonymus tingens Wall.	Spindle tree (kasuree)	Celastraceae	Fuel, also used as dye
5. Rhododendron arboreum Sm.	Burans	Ericaceae	Fuel, flowers for squash
6. Quercus semecarpifolia Sm.	Kharsu	Fagaceae	Fuel, fodder, and timber
7. Prunus cornuta	Himalayan bird cherry	Rosaceae	Fuel and fodder

(Wall. ex Royle) Steud.			
8. Taxus wallichianaZucc.	Himalayan yew	Taxaceae	Medicinal (anticancerous), fuel, timber

List of Animal Species (With IUCN Conservation Status) found in Tunganath Sacred Natural Landscape:

Scientific name	Common name	Family	IUCN status
1. Canis aureus	Jackal	Canidae	Least concern
2. Capricornissumatraensis	Serow	Bovidae	Vulnerable
3. Hemitragusjemlahicus	Himalayan tahr	Bovidae	Near threatened
4. Macaca mulatta	Rhesus macaque	Cercopithecidae	Least concern
5. Moschus chrysogaster	Alpine musk deer	Moschidae	Endangered
6. Ochotona roylei	Himalayan mouse-hare	Ochotonidae	Least concern
7. Panthera pardus	Common leopard	Felidae	Vulnerable
8. Presbytis entellus	Common langur	Cercopithecidae	Least concern
9. Pseudoisnayaur	Bharal	Bovidae	Least concern
10. Pteropusgiganteus	Indian flying fox	Pteropodidae	Least concern
Ursusthibetanus	Himalayan black bear	Ursidae	Vulnerable

List of Birds (with IUCN conservation status) found in Tunganath Sacred Natural Landscape:

Scientific name	Common name	Family	IUCN status
1. Aquila nipalensis	Steppe eagle	Accipitridae	Endangered
2. Gypaetus barbatus	Bearded vulture	Accipitridae	Near threatened
3. Lophophorusimpejanus	Himalayan monal	Phasianidae	Least concern
4. Megalaimaviridis	White-cheeked barbet	Megalaimidae	Least concern
5. Neophron percnopterus	Egyptian Vulture	Megalaimidae	Least concern
6. Pucrasiamacrolopha	Koklass Pheasant	Phasianidae	Least concern
7. Tragopanmelanocephalus	Western tragopan	Phasianidae	Vulnerable
8. Zootheramonticola	Greater long-billed thrush	Turdidae	Least concern

List of Reptiles (with IUCN conservation status) found in Tunganath Sacred Natural Landscape:

Scientific Name	Common Name	Family	IUCN status
1. Calotes versicolor	Indian garden lizard	Agamidae	Not evaluated
2. Hemidactylus brookii	Spotted Indian gecko	Gekkonidae	Least concern

3. Najanaja	Spectacled cobra	Elapidae	Near threatened
4. Orthriophishodgsoni	Himalayan trinket snake	Colubridae	Not evaluated
5. Scincellahimalayanum	Himalayan ground skink	Scincidae	Least concern

ECONOMY & SOCIETY

In the Tunganath sacred natural landscape, festivals are organized during April and October every year on the occasion of Navratri, Shivratri, Holi. At these melas, the local communities reaffirm their commitment to the forest and the deity. The heads of the communities supervise the utilization and maintenance of the sacred natural landscapes to ensure that there is no deviation from the village-appointed rules. Many plant species have also been associated with religious festivals, namely, Azadirachtaindica (Sheela Asthami, Nimb Saptami), Ficusbengalensis (Vat Savitri), Aegle marmelos (Bilvamengalsawankesomvaar), Musa paradisiaca (Kadii Vrat), and Ficus religiosa (Somvati Amavasya), due to popular and common beliefs.

Certain taboos are associated with the Tunganath sacred natural landscape. According to villagers, these taboos need to be followed by all. On the face, they may appear regressive, but have contributed a great deal in preserving the forest. These include the following:

(a) Women are strictly prohibited from entering the sacred forest due to the belief that they are impure.

(b) Fetching/collection of fodder and fuel wood and the movement of women and *shudras* (scheduled castes) have been strictly prohibited in this grove since the Mahabharata period. A temple of the goddess Hariyali Devi is located in this forest patch.

(c) Use of tools in any form (knife, sickle, etc.) on the plants and animals will be a step to hurt the sentiments of Devi (goddess). The forest fairies in turn are angered and their wrath can make person mad or deformed and also can lead to disaster in the family of offender.

(d) For a person who starts his journey, if a snake comes across his way, then he has to stop the journey and has to restart only after worshipping the god after an interval of a week.

(e) One week before pilgrimage, the villagers stop eating onion, garlic, egg, and meat.

(f) Anything that is made up of leather is prohibited in the temple and grove.

(g) Killing/hunting of animals and plucking/uprooting of plants are strictly forbidden in the sacred natural landscape.

MYTHS & LEGENDS

The Tungnath Temple is the highest Hindu shrine and is believed to be 1000 years old. It has a rich legend linked to the Pandavas, Heroes of Mahabharata epic. According to mythology, Vyas Rishi advised the Pandavas that since they were culpable of slaying their own relatives (Kauravas, their cousins) during the Mahabharata war, their act could be pardoned only by Lord Shiva.

Consequently, the Pandavas went in search of Shiva who was convinced of the guilt of Pandavas. In order to keep away from them, Shiva took the form of a bull and went into hiding in an underground safe haven of Guptakashi, where Pandavas chased him. But later Shiva's body in the form of bull's body parts rematerialized at five different locations that represent the PanchKedar, where Pandavas built temples of Lord Shiva at each location to worship and venerate, seeking his pardon and blessings. Each location is identified with a part of his body; Tungnath is identified as a place where his Bahu (hands) were seen. Legend also states that Lord Ram, the chief icon on the Ramayana epic, meditated at the Chandrashila Peak, which is close to Tungnath.

ARCHITECTURE

The temple of Tunganath is in itself an ancient temple built in the North Indian style of temple architecture. It is small in size and can barely accommodate ten people in the sanctum. Surrounding this temple, there are a number of small shrines of several gods.

The sanctum part of the temple abuts the hills where the sacred standing black rock (*swayambu* or self-manifest *lingam*) with a tilt to the left, of 1 ft (0.3 m) height, denoting the form of arms of Lord Shiva is worshipped. The construction of this temple is credited to Arjuna, the third of the Pandava brothers, who is also worshiped here. Just at the entrance, at the end of the trek path to the temple, there is a gateway with the name Tungnath painted on the top of the arch, which is of recent construction. A signage at the gate entrance gives distance to the temple as 4 km and also states that pilgrims unable to undertake the trek could leave their donations in the box (kept next to the gate).

The architectural design of the temple is similar to the temples at Guptkashi, Madhmaheshwar and Kedarnath. The temples inside the enclosure are made of stones with decorations painted on the outside and they depict tall towers. The highest dome has a wooden stage at the top. The dome has sixteen openings. The temple roofs are also made of stone slabs. At the entrance to the temple there is a Nandi stone image facing towards the sanctum where Shiva's idol is installed. The Nandis flank is normally sanctified for worship with flowers and with three lines (*tripundra*) in yellow clay, with a mark denoting Shiva's third eye, which is symbolic to Shiva's devotees. At the right of the temple entrance there is the mandatory image of Ganesha. In the main sanctum, *ashtadhatu* (made of eight metals) idols of Sage Vyas and Kala Bhairav (demi-god), disciples of Shiva, are also installed in the sanctum sanctorum. The temple also houses the images of the Pandavas and silver plaques of other four Kedar shrines.

Among the smaller shrines, the central temple is of goddess Parvati, Shiva's consort. Away to the far right there is a group of five small shrines dedicated to the Panch Kedar, which include Tungnath also as one of the PanchKedar, in addition to the main Tunganath temple.

SACRED GEOGRAPHY

Near the Akash Ganga water fall, close to Tungnath, a temple to Nanda Devi is located to denote that it is descending from heaven. A 2.5 ft statue of Adi Guru Shankaracharya is installed next to the main deity of Shiva.

PROBLEMS & PROSPECTS

The traditional medical systems of northern India (such as Ayurveda and Tibetan) are a component of culture developed over long time. Medicinally important plants have high importance for religious activities of north Indian native communities that worshiped the plants in the form of god, goddesses, and minor deities. Thus, sacred natural landscapes are the valuable repositories of medicinal and aromatic plants.

Most of the denizens residing in the vicinity of groves are very simple, illiterate, and poor and are almost without any access to modern medicine systems. But they do have conscientiously nourished their traditional knowledge, customs, rituals, and ceremonies with great potency. Local traditional knowledge and the practice of plant-based medicine are still widespread in the rural areas of Garhwal and these play an important role in primary health care. Even the local people prefer to stick to the traditional herbal remedies, and it is due to a situation of having no alternative choices, as well as poverty and belief in the effectiveness of folklore herbal remedies. The denizens living around these sacred natural landscapes have conserved the medicinal plants of these regions for use in a sustainable way by themselves and by their future generations. Religious beliefs and traditional customs have played an important role in this conservation. They have deep faith that if someone from outside the village uproots the medicinal plants from their village, it is treated as an evil act that may bring misery of great order to the village folks.

Pic. 61. Chaukhamba Peak

5 DISTRICT TEHRI

Map 7 : The Ganga in Tehri District

Spread over 3642 square feet, District Tehri stretches from the snow clad Jonli, Thalay Sagar and Gangotri peaks to the foothills near Rishikesh. The Bhagirathi is the most important river that merges with the Alaknanda at Devprayag in this district. Their confluence at Devprayag, that falls in this district, gives birth to what we call the Ganga. The term Tehri is actually derived from `Trihari` which signifies a place that washes away all the three types of sins, namely sins born out of thought (Mansa), word (Vacha) and deed (Karmana). It also means the residence of Tri-Hari or three deities who are said to reside in the three streams of Bhagirathi, Bal Ganga and Bhilangana here. The confluence of the three streams was in Old Tehri but is now submerged in the Tehri Dam. The Tehri Dam is one of the most important and the biggest hydro-electric project on the banks of the Bhagirathi and is bordered by the Koteshwar Hydro-Electric Project at its lower end.

5.1 HISTORY & LEGEND

Before the creation of the universe, Lord Brahma is said to have meditated on this sacred land. Muni-ki-Reti and Tapovan of the district are places of penance for the ancient Rishis. Its hilly terrain and lack of easy communications have helped it to preserve its culture almost intact. Tehri and Garhwal are the two words combined for naming the district as Tehri Garhwal. While the prefix Tehri is the corrupted form of the word *trihari* which signifies a place that washes away all the three types of sins, namely sins born out of thought (*mansa*), word (*vacha*) and deed (*karmana*), the other, *garh* refers to a country fort.

In fact, in ancient times,control over fortresses in the region was considered as a significant measuring rod of the prosperity and power for the rulers. Prior to 0888 CE, the whole of the Garhwal region was divided into small *garhs* ruled by separate independent principalities known as Rana, Rai or Thakur. It is said that the prince Kanakpal, who hailed from Malwa, visited shrine of Badrinath (presently in Chamoli district), where he met the then king Bhanu Pratap. Bhanu Pratap was impressed with the prince and got his only daughter married to him, also handing over his

kingdom. Gradually, Kanakpal and his descendants extended their empire by conquering all the *garhs*. Thus, up to 1803 CE, that is, for 915 years the whole of the Garhwal remained under his control.

Pic. 62. Image of Shiva and Parvati amidst images at a temple in Tehri

During 1794-95, Garhwal was under the grip of severe famine and again in 1883, the region was terribly shaken by an earthquake. Gorkhas had by then started invading this territory and heralded their influence over the region. The people of the region being already affected by natural calamities were in a deplorable condition and could not resist the Gorkha invasion. On the other hand, Gorkhas, whose several attempts for capturing the fort Langoor Garhi had earlier failed, were now in a powerful position. In 1803, therefore, they again invaded Garhwal region when King Pradyuman Shah was the ruler. King Pradyuman Shah was killed in the battle in Dehra Dun but his only son (Sudarshan Shah, was minor at that time) was cleverly saved by the trusted courtiers. With the victory of Gorkhas in this battle their dominion was established in Garhwal region. Later on, their kingdom extended up to Kangra and they ruled over this region continuously for 12 years before they were thrown away from Kangra by Maharaja Ranjit Singh. On the other hand, Sudarshan Shah could manage help from East India Company and got his kingdom freed from Gorkha rulers. The East India Company merged Kumaon, Dehra Dun and east Garhwal in the British Empire and the west Garhwal was given to Sudarshan Shah which was then known as Tehri Riyasat.

King Sudarshan Shah established his capital at Tehri town and afterwards his successors Pratap Shah, Kirti Shah and Narendra Shah established their capital at Pratap Nagar, Kirti Nagar and Narendra Nagar respectively. Their dynasty ruled over this region from 1815 to 1949. Ultimately when the country was declared independent in 1947, the inhabitants of Tehri Riyasat started a movement for independence from the royal rule. Consequently the 60th king Raja Manvendra Shah accepted the sovereignty of the Indian Government. Thus in 1949, the princely state of Tehri was merged with Uttar Pradesh and was given the status of a new district.

The period from 1000 (approx.) to 1790 can be described as the medieval period in the history of Garhwal. This period coincided with the rise and fall of the Muslim and Mughal rule in the rest of India. These developments also had a bearing on the history of Garhwal.

Pic. 63.

The mandapam at Devalgarh

Garhwal derives its name from *garhis* or small fortresses that were ruled by these chieftains. Ajaypal Panwar consolidated the small chiefdoms in the 13th century. In the early years of this period, numerous small chiefs or rulers amongst whom the *Pala* dynasty was one of the most prominent, ruled Garhwal. There are a few indications of the nature of the rise to suzerainty of the *Pala* dynasty, which in later days ruled a large part of what is now Uttarkashi, Tehri, Chamoli and Pauri districts.

It was not until the reign of Ajai Pal (1358 to 1370) that the *Palas* acquired the hegemony over a large part of Garhwal by subjugating the *Khasa* rajas. Before this time, there were very small chiefdoms under a federation that had the protection of the powerful kings of the plains, whose capital was near *Indraprastha* (Delhi).

Son Pal was the first of the kings of Garhwal about whom there exist precise records. His headquarters were in the Bhilangana Valley. Many Khasa rajas owned allegiance to him and he held sway over Western Garhwal, which included the pilgrim route to Gangotri. A prince of the Panwar house of Dharanagar came on a pilgrimage to the holy places in the hills and visited Raja Som Pal on his way. The raja had no son and was so pleased with the young prince that he gave his daughter in marriage and a part of *Chandpur Pargana* as dowry. This young prince was Kadil Pal. Ajai Pal, a descendant of Kadil Pal, brought the capital from Chandpur to Devalgarh in the 14th century and is considered to be the king who attempted to bring the scattered states of Garhwal under one authority.

Bahadur or Balbahadra Shah was the first king who dropped the surname Pal and adopted the title of Shah, which is still borne by the descendants of the erstwhile state of Tehri. According to the legend, Emperor Bahadur Khan Lodi of Delhi came to Garhwal for a vacation. He was so pleased

with the reception accorded to him by the Raja of Tehri that he conferred the title Shah upon the Raja. This visit may have taken place in the year 1353. Man Shah, one of the descendants of Bahadur Shah attained prominence around 1537. Sama Shah succeeded him, and then Dularam Shah, who was the first raja to come in direct contact with the Chand kings who were gaining power in Kumaon during that period.

There was a brief but decisive war with the Chands of Kumaon during the reign of Dularam Shah in Garhwal and Rudra Chand (1565 - 1597) in Kumaon. The latter was supreme in Kumaon and wanted to add Badhan in the Pindar valley (part of Garhwal state) to his dominion. The route to the Pindar valley passed through Someshwar and Katyur valley, which was then held by Sukhal Deo, the last reigning king of the ancient Katyuri family. Dularam Shah promised his protection if Sukhal Deo would aid him and sending a force towards Gwaldam and one towards Ganai, occupied the passes towards Badhangarhi.

Porkhu, who was Rudra Chand's general, proceeded to battle with a small band of veteran warriors through Katyur to the Pindar valley. However, his supply lines were cut off by the Katyuri raja. Soon after, a Padyar Rajput killed general Porkhu near Gwaldam. The Raja of Garhwal had promised a land grant of a day's march to anyone who would bring him the head of the Kumaoni general. The *Padyar Kajput* carried the head of the dead general to Srinagar and received his promised reward. After this the Kumaoni soldiers fled to Kumaon.

However, Rudra Chand continued to harass the frontiers of Garhwal. He even overran the Katyur valley. Rudra Chand died in 1597 and was succeeded by his son, Lakshmi Chand. The latter, too, raided the frontier tracts of Garhwal several times but was repulsed with considerable loss.

Mahipat Shah was the ruler of Garhwal when Lakshmi Chand was at the throne in Kumaon. He changed the capital from Dewalgarh to Srinagar. He consolidated his rule over most parts of Garhwal. This hilly region became very prosperous during this period. There existed mines of copper and lead, while gold was obtained by washing the riverine sediments in the Alaknanda and Bhagirathi valleys and along the Sona River in the Patli Dun valley.

In 1654-55, during the reign of Pirthi Shah, the Muslim rulers of Delhi invaded Garhwal. A force was sent under Khalilullah Khan, who speedily overran the Dehra Dun Valley, but did not penetrate deep into the hills lying further north. After this, Pirthi Shah made peace with the rulers of Delhi.

The conflict with Kumaon continued even during and after the region of Pirthi Shah. The ruler of Kumaon was Baz Bahadur, who fought on the side of Khalil Ullah, when the Muslim force invaded Garhwal. He made two simultaneous attacks on Badhan in the Pindar valley and on Lohba. The frontier fort of Juniyagarh was seized in the process. He then attacked the Tibetans in the north and during this campaign; the Raja of Garhwal took advantage of his absence and attacked the Kumaoni garrisons to recover his territory. At this Baz Bahadur reacted very quickly and drove the Garhwalis back. A hasty peace was then signed at Srinagar.

The conflict with the Kumaonis continued even after the death of Pirthi Shah and Baz Bahadur. In fact, this continued for more than two hundred years. This was primarily in the form of raids and counter raids into each other's territory.

Pradip Shah, one of the most important rulers of Garhwal, came to the throne in 1717. He was able to make temporary peace with the kings of Kumaon. This period brought prosperity to both these regions. This prosperity attracted the attention of Najib Khan, the Rohilla chief of Saharanpur, who invaded and took control of Dehra Dun in 1757 after feeble resistance from the Raja of Garhwal. This control continued till Khan's death in 1770.

In 1745, the Rohillas, under Hafiz Rahmat invaded Kumaon with a large force and occupied Almora. Kalyan Chand, the ruler of Kumaon at that time, asked for assistance from the ruler of Garhwal, who after some hesitation decided to help. The forces of Garhwal and Kumaon grouped near Dwarahat but suffered a humiliating defeat at the hands of the Rohillas. The latter even threatened Srinagar and the ruler of Garhwal was forced to pay one lakh rupees on behalf of Kalyan Chand, after which the Rohillas withdrew completely from Kumaon. After this, the Chand dynasty in Kumaon became very weak and the rulers of Garhwal often interfered in the affairs of the state of Kumaon.

In 1790, invading Gurkhas from Nepal conquered Kumaon, and fourteen years later they defeated the Panwar Dynasty, killing the reigning king, Pradyuman Shah. In 1815, the British defeated the Gurkhas and reinstalled Pradyuman Shah's son, Sudarshan Shah, as the new king of the state of Tehri Garhwal, which consisted of the western portion of the former kingdoms, while retaining control over the eastern part.

It is significant that Garhwal was little affected by external forces until the Nepali conquest. Historians like Guha (1991) are of the opinion that Panwar Dynasty ruled over Garhwal for a period of 1300 continuous years. The natural defenses provided by the lofty Himalayas, Terai (a marshy and densely forested region that now has been made famous as the Corbett Tiger Reserve) and Shiwalik ranges to the south prevented Muslim invasions even when the entire North India came under their sway, 10th century onwards.

Garhwal is significant territory for all Indians due to its pilgrimage sites. For centuries pilgrim traffic has sustained the local economies. And despite this constant contact with the mainland plains, the relative isolation – geographical, political and to a degree social, has ensured that a number of cultural forms have survived. Pandav Lila is one such cultural form that has withstood the test to time.

The cultural history of Garhwal can be traced to the migration of the aborigines: *Tangans, Partangans, Kols, Kiratas, Kinnars, Gandharwal* and *Vidyadhars* to the region. The branch of the Aryans who migrated straight from Central Asia were later on to be called *Khasas*, a tribe inhabiting the entire Himalayan region from Kashmir to Arunachal.

The region was dominated by the Naga Dynasty, under the control of the *Bhar Shivas* and the *Raj Shivas* up to 4th century. The Katyuri Dynasty followed their reign from the 4th to the 11th century in the cultural regions known as *Kedar Khas Mandal* and *Manas Khand*.

The kingdoms were divided in the 12th century into the Pal Dynasty in Garhwal and Chand Dynasty in Kumaon. King Bhanu Pratap, the last Katyuri king bequeathed his state to King Kanak Pal of Gurjar state, a place near the present Gujarat state. Ajai Pal laid the foundation of the Pal Dynasty in the 15th century in Srinagar, Garhwal. Som Chand ruled through the Chand Dyansty in Almora in

the 14th-15th century. The Gorkha aggression occurred in 1793 and 1803 in Kumaun and Garhwal respectively.

This led to a phase of subjugation bythe Gorkha that began with the assassination of king Pradyuman Shah at Khurbura, Dehra Dun. The capital of Garhwal shifted to Tehri in 1815 after the Sagauli Treaty. The Kumaon region and Garhwal district on the eastern side of Alaknanda river came to be controlled by the British, while the western side from Alaknanda river remained with the king and was known as Tehri *Riyasat* or the princely state.

The Migration pattern occurred in a manner in which the natives shifted from one place to another in pursuit of the *jhoom* or shifting agriculture. During this time, the branch of the Aryans coming from Central Asia, called *Khasas* settled in the region.

Within the Aryan and Munda substratum, the Aryan race from mainland India entered the region through three routes:

- Through Ramganga, Kosi and Kaliganga Valleys.
- Through Tons and Yamuna Valleys in the west.
- Through Alaknanda and Nayar valleys.
- Through the slopes of hillocks adjoining the Terai Plains of the Gangetic valley.

The composition of the races, thus was organized as such:

- The *Munda* substratum, being the oldest one.
- The *Khasas* or the *Khosa* of the Yamuna and Tons valleys.
- The Aryans coming along with their retinue of fighters, priests, servants, craftsmen, entertainers, and business managers.
- The latest settlers, businessmen and entrepreneurs of all colors and hues.

As far as the religious beliefs and practices are concerned, the populace is predominantly *sanatani* or believers of the eternal religion. There is however an undercurrent of the folk beliefs and rituals in all the religious practices. The number of Vedic rituals equals the number of folk rituals while the gods and deities worshipped also consist of gods of the Hindu pantheon, the mainstream traditions of India as well as the folk gods.

5.2 BUILT HERITAGE

Fly then where Ganga on the king of mountains
falls like a flight of stairs from heaven let down
For the sons of men; she hurls her billowy fountains
Like hands to grasp the moon on Shiva's crown
and laughs her foamy laugh at Gauri's jealous frown.

This is how Kalidasa addressed the cloud messenger, Meghdootam, in his ode to the Ganga, at once connecting the mighty river emerging from the celestial Himalayan realms to the world of humans. Kalidasa is said to have been born in the little village of Kaviltha in the Garhwal region of

Uttarakhand, where homes still preserve a conch and lotus in remembrance of this Sanskrit poet and scholar of electional astrology (*Muhurta Shastra*). The Ganga and its tributaries flow through this mountain landscape on their journey to the plains of India. One of the most picturesque regions of India, nature has endowed Garhwal with such beauty and spiritual bliss that it is also known as *Dev Bhoomi*, the Land of Gods. Pilgrims and seekers alike have tread upon the ancient pilgrim routes in the region for eons, seeking answers to the conundrums of life.

Ganga is arguably the most revered water body in the world. It is the fountainhead of India's pluralistic and diverse culture. Flowing through Garhwal, it has lent character to sites of immense archaeological significance. The region from the *ghats* of Haridwar, where the devout throng to bathe in the Ganga, to the origin of the river is undoubtedly a sacred and historical landscape, much visited for pilgrimage. Since most people visiting the region are focused on deriving merit from their journey, historic sites along the pilgrimage routes usually escape notice. Also significant is the fact that most of these sites are living heritage, still in use as places of worship. This article focuses on some of these lesser known sites that we can experience as we travel up the Ganga in Garhwal, to its source. But before that, a brief recapitulation of Garhwal's history is in order.

The period from approximately 1000 to 1790 CE can be described as the medieval period in the history of Garhwal. This period coincided with the rise and fall of Islamic and Mughal rule in the rest of India and also had a bearing on the history of Garhwal. Garhwal derives its name from fifty-two *garhis* or fortresses that were ruled by chieftains. In the early years of this period, numerous small chiefs or rulers, of whom the Pals were the most prominent, ruled Garhwal. Som Pal was the first of the Garhwal kings about whom there exist precise records. His headquarters were in the Bhilangana Valley, the Bhilangana being a tributary of the Ganga. Som Pal held sway over Western Garhwal where lay the pilgrim route to Gangotri. A prince of the Panwar house of Dharanagar came on a pilgrimage to the hills and visited Raja Som Pal. The Raja had no heir and was so pleased with the young prince that he gave his daughter in marriage and a part of the kingdom as dowry. This young prince was Kadil Pal. Ajay Pal, a descendant of Kadil Pal is considered to be the one who brought the little kingdoms of Garhwal under a common authority. Balbhadra Shah was the first king who dropped the surname Pal and adopted the title, Shah, which is still borne by the descendants of the erstwhile state of Tehri (Garhwal, in pre-British times). The rulers also assumed the title, *Bolanda Badri*, or the one whose word was the word of Lord Badrinath. Historians are of the opinion that the Panwars ruled over Garhwal for a period of 1300 continuous years. Natural defences provided by the lofty Himalayas, the Terai (a marshy and densely forested region that is now well-known as the Corbett Tiger Reserve) and Shiwaliks to the south, prevented invasions. Some of the most significant cultural sites in the region are these fortresses where excavations are yielding ever new insights.

Pic. 64.

Shrines like these dot the landscape and are maintained by the Army

One of the earliest amongst the fortresses of Garhwal was Chandpur Garhi. The fortress is situated on the peak of a promontory formed at the bow of a stream flowing about 150 m below it. Built in the 9th century, the site is a significant halt for the Nanda Devi Raj Jat, a gruelling 280 kilometre pilgrimage in honour of the region's presiding deity, Nanda Devi.

Devalgarh, another significant fortress of Garhwal was established by King Deval around the 14th century. Devalgarh was made the capital city in 1512 CE by Ajay Pal, and is by far the richest in terms of historic structures. Devalgarh consists of several significant sites such as the seat of Satyanath, Rajeshwari Temple, Gauri Peeth, Lakshmi Narayan Temple, Murli Manohar Temple, Som Ka Manda, Bhairav Cave and Dattatreya Temple. The seat of Satyanath is a memorial to Satyanath, a Nath yogi and remains a revered pilgrimage spot for Nath *panthis*. Devalgarh became a centre of the Nath *sampradaya* due to the patronage of Ajay Pal. It has memorials of the fourteen *mahants* who have held the seat of Satyanath. Rajrajeshwari Temple is a *shakti peetha*, the centre of Shodashi (the fourth of the 10 *mahavidyas* of Shakti). In Tantric tradition, Shodashi has been portrayed as a five-faced goddess (each representing Tatpurush, Sadyojaat, Vamdev, Aghor and Ishan Shiva). Her *yantras* or objects/diagrams used in meditation are worshipped by the Rajput and Brahmins of Garhwal, who revere her as theirpatron goddess.Gaura Peeth commemorates Gaura Devi, while Dattatreya Temple is considered the only temple in Uttarakhand where a Shiva *lingam* is worshipped along with the footprints of Swami Dattatreya imprinted on a rock. There is a temple to Rajrajeshwari, built around the 16th century, and is a part of the Gaura Devi complex. The Gaura Peeth is at the highest altitude among the Devalgarh Temples. It has idols of Mahishamardini in the *garbha griha* and another one of a goddess that remains shrouded in secrecy. Som Ka Manda, a memorial, is a double storey structure having eight elaborately designed pillars on the second storey. Devalgarh also has six tunnels cut out from rocks. These could have been used as hideouts or meditation chambers. A number of wells, with steps leading to the bottom, hewn out of rock, lie close by. Across these is the Bhairav Cave where Satyanath Yogi is believed to have prayed to Lord Bhairav. At a short distance are memorials to Nath Yogis with rock inscriptions.

Much older than the fortresses are excavation sites that have yielded unimaginable treasures. One such site is Malari, located in the inner Himalayan Zone at a height of 4000 m above msl and 60 km northeast of Joshimath. The site was excavated in 1982-83 and revealed a cave burial dug on the soft calcareous limestone on the mountain slope. The cave is oval in shape with an entrance of 1.15m height. The width of the inner portion is three meters and at the entrance, a few large boulders were kept to block the passage. The excavation yielded a complete skeleton of a Jhabu (Himalayan Yak) oriented in East-West direction with other associated funerary material including decorated red and black ware jars. Inside the cave, along with the skeleton, a big storage jar in grey ware, highly fragile iron arrowheads and a few bone arrowheads were also discovered. The most remarkable discovery was a mask made of beaten gold weighing 5.23 grams. This cave burial can be tentatively assigned a date around 1st -2nd century BC.

Garhwal is undoubtedly a religious landscape. While the more popular shrines include Kedarnath, Badrinath, Gangotri and Yamunotri, there are several other temple complexes that date back to antiquity and are archaeologically significant. One such complex is the Narayankoti Group of Temples between Rudraprayag and Chopta. The temple complex is close to five natural springs and has Shri Satyanarayana and Shri Virbhadra temples, including the Navgraha temples (of the nine planets). Another complex close by has Laksmi-Narayan temple and twenty-eight other temple structures.

But perhaps the most significant is the Adi Badri Group of Temples. Built in the 8th-12th centuries CE, it is a temple precinct with sixteen temples belonging to the Gupta period. It is a part of the *sapta-badri*, a group of seven sacred Hindu temples, dedicated to Lord Vishnu. The Badrinath Temple, called the Badri-Vishal is the primary temple among the seven shrines, followed by six others, namely, Adi Badri, Vridha Badri, Dhyan Badri, Ardha Badri, Bhavishya Badri and Yogdhyan Badri.

The abode of Vishnu in the Alaknanda Valley, starting from Satopanth, about 24 km above Badrinath extending up to Nandprayag in the south, is particularly known as the Badri-Kshetra in which all the Badri temples are located. In early times, the approach to the main temple of Badrinath was through *Badrivan* or the Badri Forest. Thus, the word Badri is suffixed to the names of all the Sapta Badri temples. The Adi Badri, the earliest among the Sapta Badri temples is dedicated to Vishnu. These seven shrines were built during the late Gupta period, from the 5th to the 8th century. The setting up of these temples, as with several others, is attributed to Adi Sankara. Adi Sankara is believed to have sanctified these temples in order to counter the spread of new religious streams. In ancient times, when access to the main shrine of Badrinath was restricted due to poor weather, pilgrims worshipped Vishnu at this temple.

Adi Badri is also sometimes referred to as Helisera. The elevation of the temple consists of a *jagati, vedibandha, kati, kapotapalika, kantha* and *sikhara*. The *sikhara* is of Nagara style in which the *griva* is surmounted with *amalasaraka* and *kalasa*. The *jagati* is provided due to a terraced land and is reached by a flight of steps from the ground to the *ardhamandapa*. The *vedibandha* is decorated with mouldings. The *kati* portion is simple and plain. The *sikhara* is curvilinear, in the *Nagara* style and consists of four *bhumi-amalakas*. The *skandha* is closed by *amalakasila*. *On the top of the sikhara* is a *kalasa*. The walls of the *garbhagriha* are topped by a *sikhara* with a prominent carved *suknasa* front that is projected from the sanctum wall. The *suknasa* rests right on the roof of the *antarala* and is provided with a niche with a figure shown in *asanamudra*. The top of the *suknasa* is decorated with *gajasimha* motif, a unique feature of Uttarakhand temple architecture. The roof of the *mandapa* stands on four square

pillars supporting the two long 12' square, massive stone beams. The roof of the *ardhamandapa* rests on two octagonal pillars. The *ardhamandapa* is provided with stairs. The roofs of the *mandapa* and *ardhamandapa* are slanting. Architecturally, the temple of Vishnu is simple and only the ceiling of the *garbhagriha, antarala* and *mandapa* are decorated. The doorway lintel is decorated with *Ganesha* on *lalatbimba.* The doorframe is decorated with the figures of Ganga and Yamuna in a manner similar to the Gupta temples.

In the town of Gopeshwar is situated the ancient Gopinath Temple, which has an interesting story. It is believed that Gopeshwar was a part of the empire of King Sagar. Sagar's cow would come to this place and offer milk from her udder to a Shiva *lingam* every day. One day, the king witnessed this and decided to build a temple at the site. Near Gopeshwar, there is a village named Sagar on the way to Rudranath that is believed to be the birthplace of King Sagar.
Gopeshwar is associated with Lord Krishna. The word has an etymological origin related to the Gopis and Lord Krishna, and hence the name Gopeshwar, the lord of the Gopis. The main temple, however, locally known as Gopinath or Rudranath is dedicated to Shiva, the object of worship here is a self-manifest or *svayambhu lingam*. The legend connecting Shiva to Krishna says that impressed with Krishna and Radha's *Raasleela*, Shiva decided to perform a similar dance with his consort Parvati. Shiva appeared in the form of a male dancer with Parvati appearing as a *gopi*, both dancing the celestial dance at this spot. Gopeshwar is surrounded by the four famous shrines of Badrinath, Rudranath, Tungnath and Anasuya Devi, the temple site itself being one of Panch Kedar.

Pic. 65.
Adibadri Group of Temples

The temple is built in the Nagara Style with a Latina *shikhara. Triratha* on plan and elevation, its*shikhara* is adorned with *chaitya* motifs all over, hence termed as *jala shikhara* in architectural canons. Some of these *chaitya* motifs are adorned with *bhadramukhas.* The *chandrasala* of its tall *sukanasa* shows Shiva in his Nataraja form. The *mandapam* of the main temple is a later addition.

Besides the main temple, there are three miniature shrines, one of which is of *valabhi* style and can be dated to the tenth century.

Within the temple complex there is a colossal metal trident over five metres high with a diameter of 20 cm. Inscribed in late Brahmi characters of sixth-seventh century, recording its erection in front of the temple of Rudra by one Ganapatinaga. Four short inscriptions of later times, in Devanagri, are cut into the metal of the shaft but only one of them is decipherable. Interestingly, as we learn from his inscription on the same trident engraved in Nagari characters, in course of time this trident seems to have collapsed and it was restored to its present position by King Asoka Challa of Dulu, Western Nepal (1191 A.D.).

Another revered shrine of Garhwal is the Pandukeshwar or Yogdhyan Badri where Pandu is believed to have installed the image of Vishnu. The life sized image is in a meditative posture and is thus called Yogdhyan Badri. According to legend, the Pandavas, after defeating their cousins, the Kauravas, in the Mahabharata war, came here to atone for the sins of fratricide. They handed over their kingdom to their grandson Parikshit, and headed to the Himalayas to perform penance. Copper plate inscriptions discovered here indicate grants by Katyuri rulers to this temple, two belonging to Lalitshuradeva and one each of Padmatadeva and Subhikshraja. The script is Pali, while the language is Sanskrit. Plates found here indicate that the region was known as Panchal Desh. One inscription extols the grant of land given by King Nimbarana.

Kunti is believed to have been married to Pandu at Pandukeshwar and Yogdhyan Badri is also considered the winter abode of the *utsavamurti* of Badrinath, when the temple doors of Badrinath are closed for the winter. Hence, it is religiously ordained that a pilgrimage to Badrinath will not be complete without offering prayers at this place. The Yogdhyan Badri temple consists of a *garbha griha, antarala and mandapam*. Both, the *garbha griha* and the *mandapa* are square on plan, devoid of any *ratha* proliferations but have a curious design in elevation. Its *varandika* rising from the square *khurachhadya* base is circular on plan, which is carried into the elevation through the *sikhara* up to the shoulder, which in turn with its perfects curve coalesces with the neck of the temple, thus looking like a cylindrical dome. Another temple known as Vasudeva Badri is *rekha shikhara* temple. Stylistically these temples are assignable to 9^{th}-10^{th} century.

While describing the historical treasures of the Upper Ganga Region, it would be inappropriate to omit the Gangotri Temple. The temple at Gangotri, is believed to have been consecrated by Adi Shankaracharya. The Gangotri Temple was severely damaged in the 1803 earthquake and was rebuilt by the Gorkha captain Amar Singh Thapa in the 18^{th} century. The temple was renovated in 1935 by the Maharaja of Jaipur, Madhosingh. The *shikhara* is 20 feet high and stands atop 10 *angashikharas*. It has an east facing entrance. The elements of the plan consist of a *garbha griha* having idols of Ganga, Yamuna, Mahalakshmi, Annapurna, Saraswati, Bhagirath and Sankaracharya. Close to the temple stands a rock called Bhagirath Shila, while at Gaurikund is a hot water spring with a self-manifest *lingam*.

The Gangotri shrine was built by King Madhosingh of Jaipur to worship Ganga in the form of a goddess. The Puranas mention that Ganga was gifted to heaven by her father Himvan and brought to earth by Bhagirath on the 10^{th} day of the month of Jyeshtha. According to the Puranas, when King Sagar left his horse for the 100^{th} Ashwamedha Yajna, Lord Indra saw this as a threat to his power and stole the horse. He tied it in Sage Kapila's hut where King Sagar and his 60,000 subjects reached soon and blamed the sage for the theft. Angered, the sage destroyed the subjects and it was

then that King Sagar and his descendants began to pray to bring Ganga to the earth, in order to free the souls of their dead kin from the cycle of birth and death. However, it was only their descendent, Bhagirath who was successful in this endeavour. Aware of the dangers of the river's unbridled flow, Bhagirath prayed to Lord Shiva to restrain the river in his locks. Ganga flowed to the earth in three parts (Alaknanda, Kumudvati and Ganga), each flowing from Brahma, Vishnu and Shiva. Lord Shiva received the massive torrent in his matted locks and released it from his locks in seven streams. The seven streams of Ganga are Bhagirathi, Janhvi, Bhilangana, Mandakini, Rishiganga, Saraswati and Alaknanda, which merge into Ganga at Devprayag.

Bhagirath Shila is believed to be the place where Bhagirath prayed to get the river to earth. Gauri Kund is where Parvati is believed to have meditated for Lord Shiva. Patangan is considered to be the place where the Pandavas worshipped several deities to ask for forgiveness for *gotra hatya* or fratricide, during the Mahabharata.

River Ganga is a revered water body which finds a mention in Puranas and has hymns like the *nadisukta* dedicated to it in the Rig Veda. Ganga worship begins from Markandeya Temple. The temple remains open from Akshaya Tritiya to Govardhan Pooja. During winters when the temple is closed, the idol of Ganga is brought in a palanquin to Mukhwa village where Ganga is worshipped as the sister of Lord Sameshwar. It is believed that she comes to her native Mukhwa on *bhai dooj* for her brother. The Sameshwar Temple is located in village Mukhwa.

The Charaksamhita, dated to around 2000 BCE mentions the water of Ganga as a health supplement while Vagabhatta's 8th century work also derives similar conclusions. In 1060 CE, Chakrapani Dutt discovered the medicinal properties of the river through comparative research. In 1808 CE, the British East India Company appointed Captain Ripper, Lieutenant Web and Hearsay to find the source of Ganga. Descriptions of this expedition can be found in the 11th volume of Asiatic Research published in 1818.

5.3 TEHRI DAM

After the formation of the state of Uttarakhand in 2000, Tehri was much in news due to the construction of the Tehri Dam over the Bhagirathi. Local activists called it an environmental disaster with the threat for floods looming large. However, the dam opened its first phase in 2006. The rock and earthfill embankment dam saw the entire town of Tehri being submerged and a new planned settlement was established in its place. This was New Tehri which now serves as the administrative headquarters of the Tehri district.

Locals share that the region from Chham to New Tehri has become a huge lake that is a part of the Tehri Dam. This has not only addressed the drought concerns but also boosted tourism with local youth being trained by the government to conduct boating tours and water sports. However, the tourist footfall is restricted to the region around this lake only. The other parts of New Tehri like Baurari do not see too many tourists and as a result, several hotels have come up around the lake. Water sports have now become popular with an annual Tehri festival being conducted regularly by the Uttarakhand government.

Pic. 66.
Lake formed by Tehri Dam

Several songs in Garhwali language and several books and articles cover the plight of those whose homes were submerged in the dam. Though the locals claim that they have been adequately compensated, they add that the new settlement still seems alien to them and is more suitable for youngsters. The older generation often laments about the loss of their homes. The local women, especially the elderly, follow a peculiar ritual every day. They visit the banks of the Bhagirathi on the Tehri Lake, the hotspot of tourism, and sit in a corner to gaze far and wide. They collectively talk about the old times and their lost homes and how people were much more amiable in the older settlement. Locals share that these women follow this practice every day and make it a point to visit the lake even if it is raining. As a result, one can see several elderly and middle-aged women on the Tehri Lake during sunset gazing into the limits of the dam.

Those who have been rehabilitated from Old Tehri have been resettled in both New Tehri and the state capital Dehradun with these rehabilitation colonies retaining the names of the settlements in Old Tehri.

5.4 BHARAT MANDIR

Built by Adiguru Sankaracarya around 12th century, Bharat Mandir is situated in the heart of the old town on the banksof the Ganges. The inner sanctum of the temple has the idolof Lord Vishnu, carved out of a single Shaligram. In theinner canopy above the idol is a Shreeyantra installed byAdi Sankaracarya. It is believed that the city of Rishikeshgrew once the temple was established, around it. Later, in1398 A.D., this temple was destroyed by Timur Lang.The temple finds mention in the Kedarkhand, Srimadbhagawat, Mahabharat, Vaman and Narsingh Puran.A sacred sree-yantra is placed in the inner canopy of the temple. Pandavas are believed to have stayed here. The site hasalso been a significant seat of Buddhism. Opposite the mainentrance are three ancient trees with roots co-mingled insuch a way that they are inseparable. The details of this ancient temple are recorded in the veryold record of Kedarkhand. Present temple is the renovatedone reconstructed on the ruins of the original templedestroyed by Timur.Structure comprises of *garbhagriha* with a hall in front. There have been many additions to the complex.

Pic. 67.

Unique rammed earth and adobe architecture of Barat Mandir

5.5 LAKSHMAN JHULA

It is a 450 feet long an iron suspension bridge. LakshmanJhula is one of the most prominent landmarks at Rishikesh.It is made over River Ganges to cross the river. It is saidthat Lakshman crossed Ganges on jute ropes between theplaces where this bridge is built. Lakshman Jhula was builtin 1939. There are spectacular views from the bridge. The Lakshman temple is close to Jhula. It was built by Maharaja Gulab Singh in 1885, thethen King of Jammu and Kashmir.According to the legend, Lord Laxman practiced penanceand austerities where this temple is built, in order to effacethe stigma of killing Ravana, a Brahmin. The mainattraction in this temple is the Rishi Kund, where Lord Ramand Lakshman bathed in order to get rid of their sins ofkilling Ravana. It is believed that Lord Rama along with hisbrother Laxman made a twin bridge, i.e. Ram Jhula andLaxman Jhula, near this temple on their way to Himalayas.Apart from this, the temple is visited by various tourists forfamous scenes that are engraved on the walls of the temple. These paintings comprise of scenes that depict the renunciation and spiritual life. Elevation of the historic structure comprises of archedopenings and niches, projected *chajjas* etc. New additionshave altered the openings and character, for exampleverandah added infront of the main shrine.

Pic. 68.

Lakshman Jhoola, a suspension wire bridge over the Ganga

5.6 ANANDA IN THE HIMALAYAS

Maharaja of Tehri used it as his winter palace and is now awell-known spa. Nestled on a 100-acre Himalayan mountain estate setamidst Sal forests, overlooking the river Ganges, close tothe towns of Rishikesh and Haridwar, it was established in2000, and it is now a spa. The property includes the royalpalace of Narendra Nagar, of the Maharaja of Tehri Garhwal (an Indian, hill princely state), and the restored Vice-regalPalace that was added to the palace in 1910–11 by theMaharaja for an expected visit of the Viceroy of India.Though the visit never materialized, the edifice remains,and went to accommodate the likes of Lord Mountbatten ofBurma, a later Viceroy of India. Soon the former Vice-regal Palace close to the Royal palace of the Shah family, of theerstwhile princely state of Tehri Garhwal originally built in1910–11, was restored. Narendranagar was the summercapital and the palace were the official residence.

5.7 CHAURASI KUTI

Maharishi Mahesh Yogi established this complex of eighty-fourmeditation caves as an ashram. In February 1968, TheBeatles visited the now-closed Maharishi Mahesh Yogi'sAshram in Rishikesh. John Lennon recorded a song titled,'The Happy Rishikesh Song'. The Beatles' composed nearly48 songs during their time at the Maharishi's Ashram, many of which appear in the *White Album*. Several otherartists, including Mike Love and Donovan, visited the site tocontemplate and meditate. This is sprawling but abandoned complex where RCCstructures are decorated with round river stones for themasonry.

When the Beatles came to Rishikesh

It all began with a film called Help! shot in London's Twickenham Studios in early 1965. The film was an unabashedly mindless slapstick comedy that sought to caricature everything Indian. Featuring the Beatles, it portrayed India through a grotesquely slanted prism—showing bloodthirsty religious cults and crazy yogis and was meant to be offensive to Indians. Ironically, it turned out to be the Beatles' first encounter with Indian

culture, a meeting that would bring them to the shores of the Ganga, in an attempt by the band to combat their inner demons.

Pic. 69.

Graffiti in memory of the Beatles at Chaurasi Kuti

It was during the shooting of this film that George Harrison first saw and heard a Sitar, being played in the background in one of the scenes. So attracted was he to this instrument that mastering it would become his lifelong quest, bringing him and his band mates to a place called Chaurasi Kuti or eighty-four huts on the banks of the Ganga in Rishikesh.

Of the Fab Four, it was George Harrison that took a fancy to India first, and began experimenting with Indian sounds in his songs. The mid-sixties were a time of excess in the West, and the Beatles, as the most popular rock band across the continents, its most wildly popular representatives.

Fame, money, drugs, sex, they had it all in ample measure. The Beatles experienced phenomenal success as symbols of teenage angst, moving on to become the poster boys of the flower power peaceniks. As their music graduated from charming love ballads to issues more cerebral and complex, reflected in their album Rubber Soul, they looked for meaning in life. George sought out Pandit Ravi Shankar, the most well-known exponent of the Sitar and became his disciple. Soon, teacher and student toured through India, the maestro introducing the Beatle to nuances of Indian culture.

In the swinging sixties the psychedelic revolution was being led by Timothy Leary, the Harvard professor, once arrested while streaking on the slopes of Kasar Devi, Almora. He gave the hippie war cry 'turn on, tune in and drop out' leading a generation into a peace and drugs revolution. John Lennon expressed this psychedelic dimension in his innovative album Revolver, in his tour de force number Tomorrow Never Knows. In George's contribution to the album, the song Love You To, it was Indian music that occupied center stage, even as the other band members looked on, not knowing how to deal with Indian instruments.

During this time, Maharishi Mahesh Yogi, an ambitious, ever giggling, godman was trying to project a short cut method to enlightenment, to the West. He described the technique as transcendental meditation, and

connections within the Indian government as well as a providential hundred thousand dollar grant enabled him to lease fourteen acres of forestland on the Ganga and build his dream ashram. Soon the Beatles, tiring of drugs, met the Yogi and enrolled as participants in a meditation course by the holy river.

George and John, accompanied by their wives, came in first, quietly, and took the dusty road to the Valley of Saints, Rishikesh in Ambassador Taxies. By this time, their new album Sgt. Pepper's was all the rage globally and the song All You Need is Love had become an anthem for the flower power generation, making them the most popular musicians ever.

Before the Beatles arrived at the ashram, another celebrity, Mia Farrow, one-time wife of the singing star Frank Sinatra, star of a popular TV shows as well as Roman Polanski's Rosemary Baby, was already there. Her addicted and psychotic sister, Prudence Farrow, who would later become the subject for the famous Beatles' number, accompanied her.

On their ride on the bumpy road, the Beatles stopped at Cheetal for lunch, in those times located by the canal, and ran up a bill of a princely sum of Rupees Thirty Five. "A comfortable three minutes, thank you", wrote John Lennon in their visitors' book, in his characteristic acerbic tone. George Harrison tried to impress with his Hindi by writing accha in Roman script, while his wife Pattie wrote, "simply delicious".

For the locals, living in close proximity to nature and animals—monkeys, squirrels, peacocks and parrots may not be special, even a nuisance at times, but for the Beatles their presence offered a great release from the celebrity circus—camera flashes, intrusive reporters, screaming and swooning women—that surrounded them wherever they went. Soon, Paul McCartney and Ringo Starr joined the group and once together, with various other musicians from across the world joining them, the time at the Ashram became their most productive, bringing out their most profound musical scores.

By the time the other Beatles arrived, John and George had visited the Rishikesh Bazaar, shopping for sarees and textiles they liked, to be cut into loose kurtas and dresses. This trend of wearing strangely cut dresses continues until today, especially amongst western travelers in India. Due to their shopping binge, media got wind of their presence in Rishikesh and the Ashram now buzzed with reporters trying to dig out every detail of what was happening inside.

The Beatles' stay at Rishikesh often brought them to Dehra Dun, in search of music at Ajit Singh's Astley Hall store, Pratap Music House. In Astley Hall's eateries, they could also grab an odd bite of non-vegetarian food. For these young stars, used to free supplies of alcohol, drugs and meat, abstaining from all three would have been penance in itself. They would often arrive at Pratap in an auto-rickshaw, looking for Sitars and Dilrubas.

Their visits to the valley led them to compose their unreleased song on Dehra Dun. Ajit Singh, an accomplished Vichitra Veena player, and a Beatles' fan, struck up a friendship with the pop stars and often visited them at the ashram. The evenings at the ashram were magical, musical and mystical, with George and John even singing the British national anthem once, themselves playing the Sitar and the Tanpura in accompaniment!

After a few weeks' stay, the stars and their companions began to leave, each for their own reasons—Ringo, because he wanted to be with his children he had left behind, Paul because he had had enough of the penance, George and John leaving in a huff because they realized the Guru was as human as anyone else—more interested in publicity, striking a huge film deal with the rock band while selling off rights to their rivals, the guru's reputation also clouded by Mia Farrow's frivolous allegations.

The stay at Rishikesh did not turn the most popular rock band ever into yogis. It, however, opened a new dimension towards life for the boys from Liverpool, who composed over twenty chartbusting songs at the ashram. Their future works, The White Album, nicknamed Tension Album by John because of differences cropping up between the band members, Abbey Road and Let It Be, featured songs composed here, even as the band never really regrouped on their return to London.

The Maharishi continued to flourish, even as his bête noire, Mia Farrow went on to marry Peter Sellers and later divorced him in a huff after he was accused of molesting her children from an earlier marriage. George, Paul and Ringo had productive and long careers, even as John's was cut short when he was shot dead outside his home. Even as the Beatles' musical scores remain anthems for generations, their stint at Rishikesh probably altered the world of music forever, with the east unmistakably mingling with the west.

5.8 BHALDIYANA NARSINGH TEMPLE

Dedicated to the Narsingh incarnation of Lord Vishnu, the current structure is a recent construction and stands near the Bhaldiyana-Motna Ropeway.

Pic. 70.
Narsingh Devta Temple

5.9 BHAIRAV TEMPLE, UPPUGARH

Bhairav Devta is the protector deity who is held in much reverence along with Ratthi Devta. It is believed that Ratthi Devta is important to please so that the town of Tehri remains safe and secure.

5.10 CLOCK TOWER, NEW TEHRI

Since it is a planned settlement, New Tehri has replicated several structures of Old Tehri including the iconic Clock Tower that one can see there today. A stadium around it is currently coming up and the once discontented youth are somewhat happy with this infrastructure.

Pic. 71.
Tehri Clock Tower recreation in New Tehri, after the original was submerged under the Tehri Lake

5.11 SATYESHWAR MAHADEV TEMPLE, BAURARI

Mentioned in the Skanda Purana, the Satyeshwar or Sateshwar Mahadev Temple was originally a temple in Old Tehri and the chief temple of the town. It had a *swayambhu* or self-manifesting Shiva *lingam* which was taken by the Maharaja of Tehri to Haridwar when the town submerged.

Pic. 72.
Satyeshwar Mahadev, inner sanctum

5.12 GURUDWARA, BAURARI

The lower area of the Baurari bus stand has a huge gurudwara which was built as a part of the new settlement and is run by a trust.

5.13 KOTESHWAR MAHADEV TEMPLE, KOTESHWAR

Located 22 kms downstream of Tehri dam, Koteshwar is a gravity dam that serves as the lower reservoir of the Tehri Pumped Storage Power Station.

The dam was inundated with floods in the year 2010 but began operations the next year. It takes its name from the town of Koteshwar which is also home to the Koteshwar Mahadev Temple. According to themyth, Lord Brahma meditated here and then Lord Shiva and Goddess Parvati appeared in the form of a Shiva *lingam*.

It is also believed that if a married woman cannot conceive, then by meditating in front of this Shiva*lingam*with her spouse, she can bear a child. The festivals of Mahashivratri and Mahasankranti are celebrated with much fervor here. Set in the backdrop of River Bhagirathi and a naturally found cave, with stalactites assuming interesting shapes, some closely resembling gods and goddesses, the site appears to be ancient while the main temple is of contemporary construction.

Pic. 73.

Site of Koteshwar Dam

5.14 RAGHUNATH TEMPLE, DEVPRAYAG

According to the legend, Lord Ram a practiced penance and austerities where this temple is built, in order to efface the stigma of killing Ravana, a Brahmin. The temple was originally constructed by Sri Adi Guru Shankarcharya. Inscriptions in Brahmi script are observed at the rear side of the Raghunathji Temple on the rocks, which date back to 200-500 A.D. As per the locals, the temple

was shattered by an earthquake in 1803 but was subsequently rebuilt by Daulat RaoScindia. Behind the temple lies a rock inscription dating to 5th century CE. Written in Brahmi script, it mentions the names of devotees who visited Badrinath or immersed themselves here. Close to themain temple is the temple of the four queens where the four wives of ruler Jayakrit Shah (1791-1797 CE) became *Sati* after the death of the king. Deoprayag finds a mention in Nepali text *Himapatskhand* and the Aalwar texts of south India as *Kandavennumakatinagaram.*

A planetarium here has preserved manuscripts of King Jagatpal (1455 CE), King Sahajpal (1548 CE), Vaman Guha manuscript of King Sahajpal (1558 CE), Raghunath Temple Manuscripts of

Pic. 74.

Ancient rock inscriptions at the Devprayag Temple

King Sahajpal (1560 CE and 1573 CE), Raghunath Temple manuscript (1561 CE), Kshetrapal Temple manuscript of ruler Manshah (1608 CE), Devprayag Shiva Temple manuscript of ruler Manshah (1610 CE), Devprayag Raghunath temple copper plate inscription of ruler Prithvipati Shah (1634 CE), Deoprayag Raghunath temple manuscript of ruler Prithvipati Shah (1642CE), Devprayag manuscript of Prithvipati Shah (1653 CE), silver plate inscription of Mathura Baurani and Amar Singh Bhandari on southern door of Raghunath temple (1664 CE), silver plateinscription of Wazir Gajesingh Bhandari on western gate of Devprayag Raghunath Temple. The planetarium was set up in 1946 by Chakradhar Joshi and preserves 3000 handwritten texts, 25,000 printed texts, binoculars and Sun Dial.

Pic. 75.

Ganga Arti at Devprayag

5.15 SEM MUKHEM

INTRODUCTION

The Himalayan region around Garhwal is coming under heavy developmental activities mainly due to construction of dams and demands over public lands, especially forests. The region is quickly losing both ecological as well as cultural diversity owing to modernization. Sankritization of local deities and rituals is also considered a reason for such attrition of traditional conservation practices. The belief systems that have sustained forest areas for centuries seem to be weakening in the wake of immense greed to exploit natural resources for exploitation. This study aims at documenting the sacred natural landscape of the Sem Mukhem region in the Garhwal Himalaya, to understand the ecological practices adopted by communities that have sustained the biodiversity over the centuries.

GEOGRAPHY

The study area is situated near village Mukhem in Pratap Nagar block, District Tehri, of Garhwal Himalaya.The forest is situated between N 30° 34' 40.5" - 30° 34' 28.7" to E 078° 26' 59.1" - 078° 26' 11.7" and lies between altitudes 2200 to 2750m above msl. The Sem Temple is situated at the top of a hill about 5 kms from the village Muhkem, which is 2 kms far from the motor head of Khamba Khal. The forest cover of the district comprises mostly of deodar, pine, oaks and alpine pastures. The forests are main economic sources for livelihood needs. Hot climate is the characteristic of the region in summer and the region experiences extreme colds in winter. The minimum and maximum (mean) temperatures vary between 0.20°C to 32°C respectively with average rain fall of 1706 mm. Rivers like Alaknanda and Bhagirathi flowing through the area are significant for Hindu pilgrims. Tehri district is in an intermediate position with respect to these sacred hilly districts of Uttarakhand. The fairs and festivals of the region aptly reveal a kaleidoscopic view on the rich and varied cultural heritage, exhibiting the dynamic social fabric of the region. Celebrated in the spontaneous continuity with great enthusiasm, the fairs and festivals are also crucial for consistently enriching the spiritual

life of local people. Festivals are the celebration of sacred and significant dates in the annual calendar of any community. The fairs include a sacred geography (Thaul), curiosity for spectacle adults (Kauthik), longing for togetherness (Mela), and religious urge for communion with the divine, and innate responses to the changing rhythms of nature.

BIODIVERSITY

The landscape is dominated by Quercus leucotrichophora A. Camus, Q. floribunda Rehder. This is a forest ecosystem. The flora includes Benthamidia capitate, Berberis aristata. The study of the Sem Mukhem temple landscape indicated 99 plant species representing 85 genera under 49 families. The recorded flora includes 23 tree, 34 shrub and 42 herb species. The species like Quercus floribunda, Quercus leucotrichophora, Berberis asiatica, Berberis aristata, Perilla frutescens and Achyranthesbidentata were dominant among different life forms. Out of 23 tree species, 18 species were found at saplings stage, whereas only 11 showed survival at seedling stage. The temple located in the landscape is of Lord Krishna and different myths do exist among the surrounding communities. This landscape has preserved the socio-cultural heritage of the region and has kept intact local rituals in spite of growing modern culture, urbanization and other developmental activities around the region.

ECONOMY & SOCIETY

Sacred forests may not always be large in area but they provide important habitat for rare and endangered plants and animals. They also play a valuable role in carbon storage. One such example is the Sem Mukhem forest where the carbon stored by trees is estimated at 345.5 tons per acre.

The temple in the forest is situated in village Mukhem, believed to be there since centuries. The Nagaraj Mela or fair is celebrated on the 26th November after every three years. Lord Krishna is said to have arrived here on this date. Van Gennep (1904) and Ruud (1960) collected many stories about the origin of species specific, none of which appear to have natural resource management ethic as their basis. An understanding of cultural attitudes and beliefs is essential in the design and delivery of conservation messages.

Research shows that people are naturally good at remembering stories and respond better to emotions and beliefs than simple facts. Sharing stories that make use of overlaps with indigenous beliefs may, therefore, be a valuable approach in conservation education and wider conservation communication.

Festivals of Shivaratri, celebrated in February-March, Janmashtami (August) and Rakshabandhan are celebrated here. It is believed that walking barefoot from the Mela ground to the temple can make wishes come true. The normal tourist season is in the month of April, May and June. Mule service is available during festivals on demand. The Temple Priests or pandas of the village Mukhem presently provide accommodation. Apart from that, there is one Ashram of Swami Kulananda, where minimum boarding and lodging is available. Devotees can stay in this ashram. Currently the tourist infrastructure at the temple is not adequate. The major infrastructure bottlenecks include narrow and damaged approach road to the temple and lack of basic facilities such as toilets, accommodation and rest shelter near the temple. The sub project is intended to provide these facilities to tourists.

MYTHS & LEGENDS

The temple and landscape is dedicated to Nag Raja, the serpent King, at Sem Mukhem, located in Pratapgarh block of Tehri Garhwal District. The people of the area hold the temple in high esteem. People consider it as the fifth dham after Gangotri, Yamunotri, Kedarnath and Badrinath.

The fair attracts lakhs of devotees from different parts of the State and beyond, who take blessings after offering prayers. Present condition Sem Mukhem is an ancient temple of Lord Krishna. It is believed that in the DwaparYug, a brave chieftain by the name of GanguRamola used to live at GarhMukhem. On hearing about his strength, Krishna assumed the guise of a hermit to test him. The lord sought alms at his home but Ramola's wife said that the alms would be given after he returned home from the forest. Angered at this, Lord Krishna turned Ramola and his 180 buffaloes to stone, which can still be seen at the site. She realized who the Rishi was and sought her husband's life back from Krishna, who refused to concede and gave her water instead. Later the Lord lost himself in meditation in this sacred and naturally beautiful area. Now, once in every three years, thousands of people throng with musical instruments to the fair held here.

The prevalent myth goes back to at least 1300 years, when a king named GanguRamola ruled over the territory. His wife Sunaina was a devotee of Krishna. Since the couple were childless, Krishna appeared in a dream to Sunaina. After this, Krishna appeared before the king, asking for the seven Sems over which he ruled. The king refused to oblige even as the queen pleaded before him to oblige. Krishna, angered at the refusal, turned the king's flock, then grazing at a place called Santraju Saur into rocks. Finally, theking was forced to part with the seven sems, Pragata Sem, Santraju Sem, Aruni Sem, Bharuni Sem, Gupt Sem, Talbala Sem and Saili Sem. Soon the couple were blessed with twins Sidwa and Bidwa. To celebrate their birth the king built the present temple to Naagraja.

Sidwa and Bidwa later became masters of Tantric arts, learning from Guru Gorakhnath. According to the Ghadiyala or the folk ballad sung at the temple, Lord Krishna's help was sought by the king to destroy the demoness that afflicted the region. Both Sidwa and Bidwa are considered deities of the shepherds.

BELIEFS & TABOOS

The following were noticed:

1. Krishna's footsteps are believed to be found all over the landscape.
2. Talbala Sem is represented by a marshy space, a bog. While walking past the bog, it feels that the earth is shaking.
3. In Aruni and Santranju Sem, playing music or whistling is prohibited as the space is believed to be frequented by acahries and fairies.
4. Gupt Sem has a lingam while at Pragata Sem is a temple to Naagraja.

ARCHITECTURE

The architecture is modern and nothing of heritage value remains.

PROBLEMS & PROSPECTS

The following needs to be done on priority in the site:

1. Construction of fence around the sacred site.
2. Plantation of fodder trees like Banj, ANyar and Ficus.
3. Construction of nbunds and water tanks to store water for irrigantion and as watering holes.
4. Rehabilitation of degraded landscape.
5. Restriction of soil erosion.
6. Controlled cultivation of aromatic plants and shrubs is desirable.

Pic. 76. Terrace Fields and Homsteads

5.16 KUNJAPURI LANDSCAPE

INTRODUCTION

Kunjapuri Siddha peeth is situated at 30° 11' N latitude and 78° 28'E longitude, at an altitude of 1,645 m. As one of the 52 Siddhapeeths of India, this place is dedicated to goddess Kunjapuri Devi. It lies in the temperate region encompassing three major ecosystems i.e., forest, grassland and hill terraced cultivatedecosystem. It lends a panoramic view of snow clad Himalayan Range in the North (ChaukhambaRanges) and an exhilarating view of the sacred river Ganga, Rishikesh, Haridwar, DoonValley and Shiwalik Hills in the South. This captivating site of Kunjapuri is an alluring attraction for the pilgrims and tourists, who visitthis place from all over the country and world.

About 150-200 pilgrims and 10-25 foreign tourists per day visit the temple. During Navratras, a religious fair is celebrated every year where over fiftythousand people gather for the celebration. Kunjapuri offers attractive destination for adventure tourism like trekking, paragliding.

A total of 239 plant species belonging to 78 families and 207 genera can be found here. Out of these, nine species are considered threatened and three species vulnerable.

BIODIVERSITY

Some Valuable Plantsfoundin the Kunjapuri Sacred Natural Landscape

Species	*Family*	*Category*
1. ***Acer oblongum***	Aceraceae	Endangered
2. ***Bergenia ciliate***	Saxifragaceae	Near threatened
3. ***Carpinusviminea***	Betulaceae	Rare
4. ***Coleus forskohlii***	Lamiaceae	Rare
5. ***Cymbopogon distans***	Poaceae	Rare
6. ***Delphinium denudatum***	Ranunculaceae	Critically rare
7. ***Fraxinus micrantha***	Oleaceae	Rare
8. ***Heteropogonmelanocarpus***	Poaceae	Rare
9. ***Swertiachirayita***	Gentianaceae	Critically rare
10. ***Thallictrumfoliosum***	Ranunculaceae	Vulnerable

The floristic diversity further shows a great range in life forms viz., herbs or forbs (92 genera and 98 species), shrubs (55 genera and 63 species), trees (30 genera and 34 species), grasses (20 genera and 22 species), climbers (11 genera and 15 species) and sedges (4 genera and 7 species). *Clematis* of the Ranunculaceae family was the most dominant genus (5 species) among all the plants collected followed by *Rhamnus* (4 species) of the family Rhamnaceae, *Rubus* (3 species) of the family Rosaceae, and *Plectranthus* (3 species) of the family Lamiaceae.

ECONOMY & SOCIETY

Kunjapuri is a sacred natural landscape that has come to depend upon tourism revenues. Proximity to the Ganga and the Lakshman Jhula area, that has emerged as a hotbed of yoga and spiritual tourism has led this spurt in economic activity. During our visit to the site, we observed hordes of tourists trekking up to view the sunrise, early morning.

As such the site bears carbon footprint of unrestrained tourism activity. Probably the biggest issue here is unrestricted camping. This leads to garbage, especially non-biodegradable. The site is exploited beyond its' carrying capacity and requires so checks and balances to not only maintain the sanctity of the site but also to preserve the valuable floral wealth of this sacred natural landscape.

MYTHS & LEGENDS

According to Hindu mythology, *siddhapeeth* is a holy place where all your wishes are fulfilled. In India there are 52 siddhapeeths. These *siddhapeeths* have their own forests called sacred forests. These forests are traditionally managed by people and set aside for religious purposes, and hunting and logging is generally prohibited in these holy places. Sacred forests are special systems of biological heritage and preserve representative genetic resources for generations. They are often the last shelter for endemic and endangered plant and animal species. They are full of medicinal plants mostly used by the local *'vaidyas'* (ayurvedic physicians). They also act as gene pool containing wild relatives of crop species, which can be helpful in improving cultivated varieties. Dense sacred forests also prevent soil erosion and are perennial source of water to the nearby villages.

Goddess Sati had sacrificed her life in the *yagna kund* of the sacrifice organized by her father Daksheshwar, then Lord Shiva, in his rage began to dance the celestial dance, the Tandava.Hechurning the whole universe with the dead body of Sati. In order to save the universe from destruction, Lord Vishnu dismembered the body of Sati with his Sudarshan Chakra. The bodywas divided into 51 parts, of which Sati's chest fell on this place; hence the temple is called the Shri Kunjapuri Devi Temple.

The area viewed from top of the temple is considered sacred and is having good influence of the deity. This temple is surrounded from all sides by dense oak forests. People believe that the goddess has been always there from the primeval period, and is always beneficial to people. There are some old statues and lots of iron trishuls (tridents) outside the temple. The journey to this temple can be carried out any time, but if done during Navratra of any month then it makes a difference. The temple here is very small, and contains a Shri Yantra carved out on a flat stone instead of any idol. Traditionally, a cloth canopy is tied to the ceiling over this Shri Yantra once a year and the Brahmin priest doing this blind-folded.

ARCHITECTURE

The architecture at the site is not very notable.

SACRED GEOGRAPHY

Kunjapuri Devi Temple has a vast view of the shadowy mountains and like Swargarohini, Gangotri, Banderpanch and Chalankha.
Kunjapuri lies in the sacred triangle of shrines Chandrabadni, Kunjapuri and Sarkunda Devi. The shrines are visited by pilgrims along the Char Dham route and is also, now, frequented by Kanwar yatris. Another aspect of the sacred natural landscape is its proximity to Narendranagar, the winter seat of the Tehri Maharajas. This lent the sacred natural forest, a shrine frequented by royalty, additional protection.

PROBLEMS & PROSPECTS

Presently, the health of this sacred forest is deteriorating under constant anthropogenic pressures. These disturbances are also a threat for various rare, vulnerable and threatened plants. These forests are maintained and managed by the forest department and the locals are not co-operating. Therefore, the government should either promote community-based conservation of biodiversity in these forests or their administration should be handed over to temple authorities.

Presently, health of this sacred grove is deteriorating under constant anthropogenic pressure. Constant grazing, extraction of fuel-wood, collection of medicinal plants and non-wood forest products etc. are affecting the biodiversity of the region. These disturbances are also a threat for various rare, vulnerable and threatened plants of the sacred grove. Currently the forest is maintained and managed by the forest department and this being a non-sacred protection, the locals are not co-operating. Historically, people may dare to break the law of local rulers, but dared not to challenge the authority of the local deities. Therefore, the government should either declare these forests as preservation sites, incorporate them into modern conservation systems, to promote community-based conservation of biodiversity or administration of these forests should be handed over to

temple authorities. This will not only protect the diversity of the sacred grove, but also improve the deteriorating condition of the sacred forest**.**

Pic. 77.
Kunjapuri Temple at sunrise

5.17 CHANDRABADNI SACRED LANDSCAPE

INTRODUCTION

The Chandrabadni Mountain landscape, another Siddha Peeth, on the border of Tehsil Devaprayag and Pratapnagar in Tehri Garhwal district is well known for the temple of Chandrabadni Devi. The goddess associated with the temple is Durga Mata Sita (wife of Lord Shiva and daughter of Daksha Prajapati), considered as one of the famous deities in Garhwal Himalaya. The area viewed from the top of the temple is considered sacred and stands under a good influence by the deity. Said area consists mostly of dense oak forest on all sides of the mountain and is rich in biodiversity. Besides the Chandrabadni shrine, there are shrines to Jagdambeshwar Devta, Ulkeshwari Devi and Anusuya Devi.

GEOGRAPHY & ECOLOGY

The sacred shrine lies on top of the mountain Chandrabadni (historically Chandrakut) an altitude of 2.277m above sea level. It is approximately 10 km north of Kandikhal, 32 km from Deoprayag and 109 km from Narendra Nagar. The temple is approached through a paved trekking pathway from Jamnikhal. On a clear day, a part of the Himalayan range can be seen from the top. The peaks visible are Surkanda, Kedarnath and Badrinath.
A study of vegetation status and plant diversity at Chandrabadani forest reveals a total of 89 species, belonging to 38 families. 82 genera were recorded in the studied forest. Out the total species, 23 were found in tree layer, 29 under in shrub layer and 37 species were found in herb layer. The species richness was found higher in moderately and highly disturbed stand. Tree density was recorded maximum at the undisturbed stands followed by moderately and highly disturbed stands

while the shrub density was observed greater at moderately and highly disturbed stands. Diversity indices among all disturbance stands showed greater values at moderately and highly disturbed stands.
The climate is sub-tropical, with a three-season cycle of rainy (June-September), winter (October-February) and summer (March-June). Due to the elevation, snowfall is possible on the hilltop during winters.

ECONOMY & SOCIETY

The local population is generally dependant on agriculture. The major crops grown are wheat, rice, maize, mustard, barley, ginger, potato and pea (among others).
Deities of both genders are worshiped in the area. However, people think feminine deities are stronger as compared to male deities. There is no hard discrimination among genders and both male and female groups can participate in the worship. Yet people are of different opinions regarding the entering of women undergoing their menstrual cycle. There are strict rules and regulations to be followed during worship. The worship in Chanderbadni can be conducted only by Brahmins of the Pujar village. Other people can perform activities such as drumming, cleaning and other works at the temple.

MYTHS & LEGENDS

The myth of Chandrabadni Siddha Peeth is part of the story of goddess Sati, the first consort of Lord Shiva. She is the daughter oh Daksha, who is in turn one of Lord Brahma's sons. Many versions exist on the yajna (sacrifice) organised by Daksha, which leads to Sita's self-immolation and the creation of the various Shaktipeethas. This multitude of stories and interpretations reflects the diversity of (especially vernacular) Hinduism.

One version is written on a marker by the Uttarakhand Tourism Department, to be seen when starting the climb towards the temple (figure 3). Therein Daksha did not invite Sita's husband, Lord Shankar (Shiva), to the sacrifice in Haridwar out of pride. In other sources there is also mention of Daksha disapproving of Shiva as a respectable husband to his daughter. Sita wanted to attend the sacrifice herself but her husband forbade it. Unable to control her emotions, Sita went anyways and upon finding out that there is no place reserved for Lord Shankar, she sacrificed her destroyable body in the fire out of rage. In other sources, this process is described as Sati transforming in her rage to the celestial form of Adishakti, being the goddess of all energy and power. Thereby she terrorized all the guests and with her radiance and heat she set the body of Sati on fire. In the second part of the story, Shiva came to know of what happened to Sati and his anger knew no limits. He destroyed the sacrifice and beheaded Daksha. With Sati's body over his shoulder, he moved towards the mountain Kailash, while the whole universe was shaking under his rage. All the gods became rightfully worried and so it was Lord Vishnu, who used his Sudarshan Chakra (sharp-edged spinning wheel) to cut Sati's body into 51 pieces to end Shiva's rage. In other sources, the all-forgiving Shiva gave back life to all his victims, even Daksha, whose head was replaced with that of a goat. The body pieces fell all over the country and wherever they hit the ground, they were enshrined as a Shaktipeetha (a seat of Shakti, the female energy). It was Sati's torso which fell on the hill Chandrakut, which thereafter was called Chandrabadni. Sati's weapons are said to have fallen here alongside her torso, which explains the many trishuls (tridents) seen around the shrine.

The Pandit present at our time of visit underlined the power of Sati's torso, which is said to be stored above the temple sanctorum to this day. During the time of the temple's creation, anyone who worshipped Sita went straight to samadhi, an advanced state of consciousness normally reserved for advanced yogis and gateway to moksha. For fear of a devastating effect on society, if that many people would reach that state, Lord Shankar lifted the torso up and used an instrument to stabilize it and contain its energy.

Traditionally, a cloth canopy is tied to the ceiling over the shri-yantra once a year and the Brahman priest doing it has to do it blind-folded. As per the belief, pujaris (temple caretakers) come from only one village, i.e. Pujar Village. Goddess Chandrabadni is also considered as the kul Devi or clan goddess of this village.

In the south of the temple, at about 3 km distance amid dense forest, is located the temple of God Bhiarava, which is also known as one-legged Bhiarava. According to the myths, the one-legged Bhiarava is present there as protector of Chandrabadni goddess, in meditation state. During the snowfall, the signs of footprints appear around the temple. The temple here is very small and contains a shri-yantra carved out on a flat stone instead of any idol. As at Chandrabadni, a cloth canopy is tied to the ceiling over this shri-yantra once a year and the Brahmin priest does this blind-folded.

Jagdambeshwar temple (Shiva temple) is in the village Jamu/Ravigram in the Ukhimath block of Rudraprayag district. Surrounded by forest, it is situated near the village, 2 km on motorable road, and visited throughout the year. It is said that the saint Shri Jagdambeshwar worshiped Shiva at this place. His wife Renuka was also with him and the stream flowing from the north of the temple is known as Renuka. Lord Shiva appeared before Jagdambeshwar on this site, and therefore this is also known as Shiva temple. Along the Shiva temple, the forest encompasses other religious places such as Chandika Devi temple, Morkajad, Narsingh Devta and Naketal. The belief for the conservation is that the source of water to this place is from Trijuginarayan, and all the goddesses and gods from distant places (Kedarnath and Badrinath) come to this place to take a holy dip in the waters. Before taking a bath, they must cross the Morkajad (a group of trees considered sacred) to reach Naketal. Naketal is situated at the top of this forest and is believed to be a home of Nag Devta.

According to myths, Ulkeshwari Devi had warned the people before Garhwal was occupied by Gurkhas. Her temple covers a cluster of many villages. People of different castes and statuses reside in these villages, but there is a strong belief regarding this deity as there is no difference in the faith. The Anusuya Devi landscape is situated in Dasholi Block/Mandal Range of district Chamoli. The Temple is situated away from main road of Mandal on 5 km of foot track, which is also en route to Rudre-Tung Himalaya. This landscape is considered as protected, because of the presence of temples of some sacred sites like Anusuya Devi temple, Attramuni ashram, Amdar Devta temple, and Dodga Devta. Maharishi Attri, who is one of the seven saints among great Maharishis after Kashaf, Ustreey, Jagdambeshwar, Bharadwaj, Visha Mitra and Gautam. The temple of Anusuya is famous as most of puja (worship) is carried out therein.

It is said that once Maharishi Attri was very thirsty, making Devi Anusuya pray to the goddess Ganga, and Ganga changed its direction and moved upwards towards Maharishi in the form of a spring, which is known as Amrit Ganga, and the place where the water falls near the cave is known as Amrit Kund. According to Hindu mythology, on one day, the wife of a Brahmin named Kaushik showed her determined duty to save her husband's life from the curse given by Mandakya Muni. She

did not allow the sun to come out for seven days, and the earth was in darkness by her action. The life on earth was not running normally and at last by the request of goddesses Anusuya, life was brought to normality. The Temples of Gandiyal Devta, Bhairav Devta and Bhagwati Devi exist within these forested patches. In Gandiyal Devta temple, worship is offered twice a year: Once before the sowing of agricultural crops, and secondly during the harvesting period. The first harvest is offered to the deity, whereas in the Bhairav Devta temple, worship is offered throughout the year. These three temples are situated on different corners of this forest and are believed to be its caretaker.

5.18 FESTIVALS

The organization and celebration of fairs and festivals has preserved the traditional and socio-cultural heritage of the region to a great extent. Melas or festivals are organized in the month of April and October every year on the occasion of Navratra, where people from adjacent villages celebrate the festival, and meetings are held for the conservation of forests and their sustainable management. These festivals have been effective in the conservation of the area's socio-cultural heritage. Festivals of Dussehra and Ram Navami are celebrated by people around Ulkagari region, which is also a traditional practice to create awareness regarding conservation programmes. A two day fair in the month of December is celebrated as Anusuya Mela, during which RathDoli from nearby GhramSabhas is taken from village temples to the Anusuya Devi temple. Taking the principal guardian deity out of the temple in a decorated doli is practiced in all these temples. People across Garhwal come there to celebrate the special prayers and worship is offered at the Anusuya Devi temple.

A large fair is held in the month of December on the occasion of Duttatreya Jayanti. Thousands of pilgrims come here to worship the Goddess throughout the night with lamps ablaze in their hands.

TABOOS, RITUALS & RESTRICTIONS

The taboos and rituals associated with these sacred natural landscapes has been one of the motivating factors for a sustainable use of resources. The water source in the Jameshwar forest is from Trijuginarayan and, as previously mentioned, all the goddesses and gods from places like Kedarnath and Badrinath come to this place to have a bath. No spitting and construction of toilets is allowed nearby the Ansuiya temple. Normally, worshippers visiting these temples stop eating onion, garlic, and egg before a week. People also sometimes leave their footwear way behind in the fringes and visit the temple with bare feet to make their wishes come true. In certain cases, people get their heads shaved to make ceremonial offerings to the god. Earlier, people used to remove leathery items before entering these sacred landscapes. The killing of animals resembling Hindu gods and goddesses is prohibited. In some landscapes, even the extraction of biomass is prohibited from one week to many years. The use of iron weapons like axes is prohibited for the felling of trees. Species like Cedrusdeodara, Prunus cerasoides and Celtisaustralis are considered sacred in Hindu religion and are hence protected and used for religious purposes only.

SACRED GEOGRAPHY

The temple complex is located atop of a hill. After a trek of a kilometre, a flight of steps leads to the first level of the temple complex. At this level the temples of Lord Shiva and Lord Laxmi Narayan are situated. On the northern side, a house for the pujari of the temple is constructed. Another flight

of steps leads to the main temple of Chandrabadni. The temple is octagonal in plan with a veranda around it (figure 5). The main temple inside is very small and contains a shri-yantra carved out on a flat stone instead of any idol. The power emanating from Sita's torso above the main temple accounts for the great significance ascribed to this place.

PROBLEMS & PROSPECTS

The sacred landscapes are mostly administered by the Forest Department like the rest of the groves in India. However, due to the presence of local inhibiting human populations, they have raised community forests, administrated by them, and allowing people to be in contact with these landscapes as well. Green felling has been banned, and partial extraction of biomass in the form of dead wood, fallen trees and dry matter, is allowed from the forest floor around the temples. The awareness among villagers about the conservation is historical and social fencing and demarcations by red pieces of cloth in the fringe areas are substitutive conservation tools to protect these forests.

Agro-forestry and social forestry practices have been adopted by villagers, by which an intense anthropogenic pressure on forests and forest products is being reduced. The use of weapons makes deities unhappy and has been stopped partially by the local inhabitants. Van Panchyat Committees, in collaboration with forest department officials, have also set up regulations for a better management of pristine forests by the communities.

CHANDRABADNI TEMPLE

At Maroor, the forest is opened in the autumn season for collection of fodder only from Oak trees. For construction purposes, Rs. 150 must be deposited in the Panchayat for cutting down one tree of Pinus roxburghii with prior permission. Both male and female groups are involved in the decision-making processes and management issues.

Human activities such as the collection of fuelwoods, fodder, timber for construction, and cattle grazing affect the ecological status of landscapes, whereas developmental activities like road construction, dam establishment and other income generating activities may force younger generation to ponder, that such landscapes were only superstitious. Present observations confirm that traditional rituals and taboos are respected by older generations, whereas the younger generation is migrating to earn their livelihood activities. Fading traditional knowledge from older to younger generation may no longer preserve the traditional heritage of knowledge.

This site is of immense significance to local communities. However, most of the vernacular architecture has disappeared in the region. There is a need to develop a palette of local materials for repair and renovation works which are non-detrimental to the heritage character. Incremental additions within the complex should be carefully planned, with material and construction conforming to or respecting the heritage structure.

Site interpretation is essential in order to make people realise the sacred nature of their forest. Waste Management needs to be enforced and especially plastic waste from rituals needs to be regulated as the water bodies are strewn with such materials and the harmful chemicals from them leaching into soil and water.

The present study suggests that the mounting pressure of human populations on natural resources like forests in the Garhwal Himalaya can be reduced by bringing local communities together with the support of the Forest Department. More forested areas should be brought under the traditional conservation (taboo) system. These measures are extremely important to achieve sustainable conservation. The entire area is religious and both male and female deities have great influences on the lives of local communities, indirectly influencing the conservation practices. Traditional celebrations of fairs and festivals are keeping the cultural heritage of the region intact.

Pic. 78.
Chandrabadni Temple

5.18 FESTIVALS

GANGA DUSSEHRA

The Ganga Dussehra is celebrated with much fanfare in the month of June and several villages organize worships through local priests on the banks of the Bhagirathi. In the district however, the biggest fair on this occasion happens at the Surkanda Devi Temple, near Dhanualti. This is situated at the Surkanda Peak in the Saklana range of the Himalayas at an altitude of 2510 meters.

BASANT PANCHAMI

The town of Old Tehri saw a huge fair on the occasion of Basant Panchami and thousands of people congregated for a holy bath at the confluence of the three streams namely Bhagirathi, Bal Ganga and Bhilangana. While this fair still happens in the town of New Tehri and is organized with much celebration, the ritual bathing no longer happens since the confluence has submerged in the Tehri Dam.

AGRICULTURE AND TRADITIONAL KNOWLEDGE SYSTEMS

Very few people are still engaged in agriculture with most migrating to businesses after the submerging of Old Tehri. The chief crops grown in this area are Mandua, Jhangora, wheat and rice. Locals have observed an increase in the population of wild boars and often lose produce due to their attacks. Old Tehri used to be the chief mandi or wholesale vegetable market for nearby villages but its submersion has now shifted the mandi to Chamba.

Tehri is famed for its heavy nose ring the Tehri *nath* which is made of red and white pearls and gold. It is usually gifted to the bride by her maternal uncle. Locals share that the nose ring made by the Panwar families of Tehri were once the most popular and needed much expertise. However, the design is now available everywhere. They also share that the weight of the *nath* has reduced with brides requesting for a lighter version of the same so that they can wear it for longer hours comfortably during their wedding ceremonies.

Some of the medicinal herbs that are used in this region are Kadvai which is usually given to infants for stomach ache. It is administered in a liquid form. Another herb is Kingoda, a yellow coloured thorny bush that is boiled to make eye drops. These drops are said to be the best cure for eye infections.

Pic. 79.

Festive celebrations in a village

5.19 FLORA AND FAUNA OF THE REGION

Animals

1 **Flying squirrel**:

a. Flying squirrel, (subfamily Pteromyinae), any of 43 species of gliding squirrels. Although these rodents do not fly, glides of up to 450 metres (almost 1,500 feet) have been recorded for Oriental giant flying squirrels (*Petaurista*).

b. Ample, loose skin and underlying muscle typically form a fur-covered membrane between each forelimb and hind limb; some species have smaller membranes between the head and wrists and between the hind limbs and tail. A cartilaginous rod that extends from the wrist supports the front part of each membrane alongside the body.

c. Some giant flying squirrels of tropical India and south eastern Asia weigh 1 to 2.5 kg (2.2 to 5.5 pounds) and have a body length of about 30 to 60 cm (12 to 24 inches) and a tail 35 to 64 cm long. Their dense fur is soft and long and either silky or woolly in texture.

d. Unlike other squirrels, flying squirrels are nocturnal. They den in tree cavities, grottoes or rock crevices on cliffs, and cave ledges. Some also build globular nests high in trees where branches join the trunk. Nests are made of leaves, shredded bark, mosses, or lichens.

e. Humans have long sought to replicate the flying squirrel's gliding abilities. Base jumpers and skydivers have developed a special suit that mimics the flying squirrel. The suit works to slow their descent and allows them to manoeuvre through the air.

f. IUCN Status: Critically endangered

2 **Musk deer**:

a. Musk deer, (*Moschus moschiferus*), small compact deer, family Cervidae (order Artiodactyla). A solitary shy animal, the musk deer lives in mountainous regions from Siberia to the Himalayas. It has large ears, a very short tail, no antlers, and, unlike all other deer, a gall bladder.

b. The musk deer is grayish brown, with long coarse brittle hair, and stands 50–60 cm (20–24 inches) at the shoulder, slightly higher at the rump. The male has long upper canine teeth that project downward from the mouth as tusks and has a musk-producing organ, the musk pod, on its abdomen. The musk from that organ is valued for use in perfumes and soaps.

c. IUCN Status: Endangered

3 **Himalayan Tahr**:

a. The Himalayan tahr (*Hemitragus jemlahicus*), found from Kashmir to Sikkim, is reddish brown to dark brown. The male has a full mane covering the neck and forequarters. Himalayan tahr has been introduced to New Zealand, North America and South Africa mainly for the purpose of hunting.

b. Himalayan tahr can reach 3 to 4.7 feet in length, 2.1 to 3.3 feet in height (at the shoulder) and 79 to 189 pounds of weight. Males are larger than females.

c. Himalayan tahr has small head with large eyes and small pointed ears. It has short legs with well-developed hooves. Rubbery cores and sharp rims of hooves facilitate climbing over the smooth and rough rocks on the steep terrains.

d. Himalayan tahr has backward curved horns that can reach 18 inches in length. Both males and females have horns, but they are larger in males.

e. Pregnancy in females lasts 7 months and ends with one (rarely 2) baby. Female leaves her group to give birth. Baby is well-developed and able to walk shortly after birth. Young Himalayan tahr depends on the mother's milk until the age of 6 months. Himalayan tahrs reach sexual maturity at the age of 2-3 years.

f. IUCN Status: Near threatened

4 **Goral**:

a. Goral, (genus *Naemorhedus*), any of three species of small goatlike mammals (family Bovidae, order Artiodactyla) native to highlands from India and Myanmar to the Russian Far East. They have slightly backward-curving, cylindrical, sharply pointed horns and a brownish gray to bright red coat.

b. Gorals weigh 22–32 kg (48–70 pounds) and stand 55–80 cm (22–31 inches) at the shoulder, depending on the sex and species.

c. Gorals are solitary (adult males) or live in small groups (females, subadults, and kids) either in mountain woods with glades or at forest edges, up to the timberline. The rut falls in the autumn, with some local variation. Gestation is six months, and normally only one offspring is delivered.

d. IUCN Status: Near Threatened

5. Barking deer

a. Produces calls similar to a dog barking, usually on sensing a predator.
b. Has a short but very soft, thick, dense coat.
c. Colouration of the coat changes from dark brown to yellowish and greyish depoending on season.
d. Male muntjacs have short antlers.

6 **Trees**

a. Sal Trees
b. Banj/ Oak Trees
c. Rhododendron

7 **Medicinal Plants**

a. Ashwagandha
b. Brahmi

Pic. 80. Barking Deer

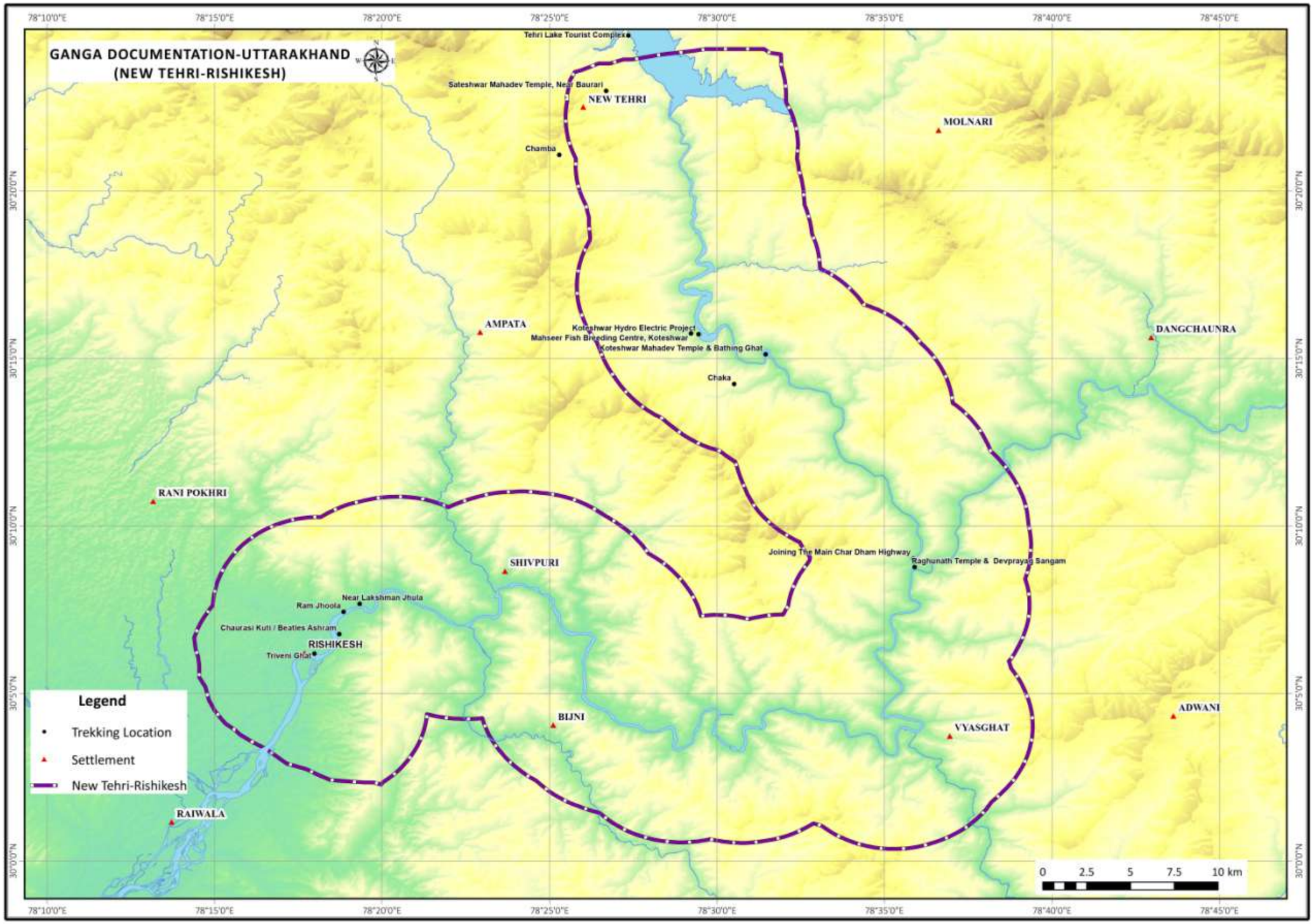
Pic. 81. Himalayan Tahr

Pic. 82. Sal Trees

Pic. 83. Ashwagandha Herb

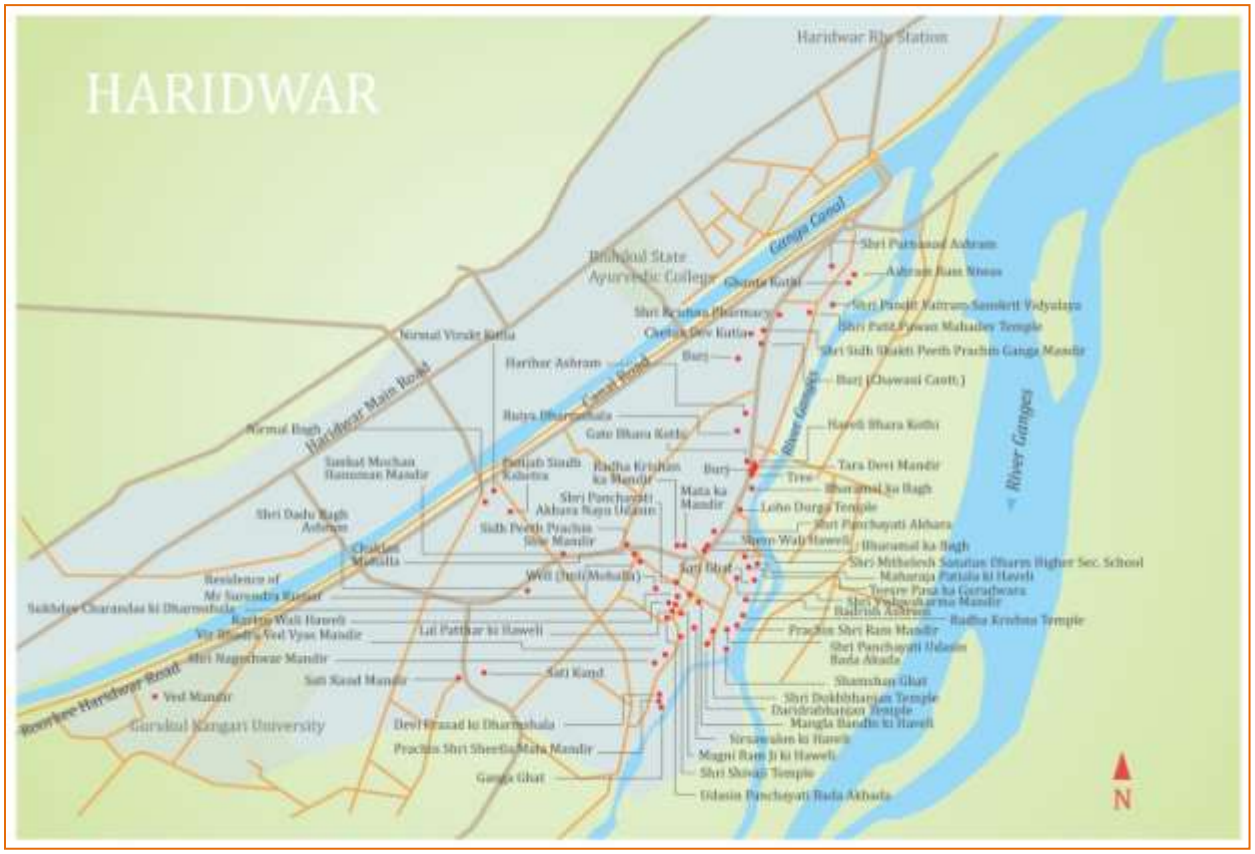
Pic. 84. Banj Trees

Pic. 85. Brahmi



Map 08: Over View Map [New Tehri - Rishikesh]

6 DISTRICT HARIDWAR



Map 9 : Heritage Sites in Haridwar

Pic. 86.
Chilla Barrage

After flowing from the mountainous region of the state, the river enters the quaint town of Rishikesh. From downstream of Rishikesh, in Virbhadra region the major chunk of water gets diverted through the upper Ganga canal which from Haridwar district of the state to Roorkee. And the river Ganga, locally call as Neel Ganga takes the route of Najibabad, parallel to the upper Ganga canal. This canal starts from the Chilla Dam, lies in the connecting road of Rishikesh and Haridwar. The construction of the Dam was started in Oct. 1974 and all the functional works were completed by Dec. 1980. The Dam has four units of the power house which were commissioned in March,1981. It adds 720 million units of electricity annually to the national gridthat would upscale to 920 million after full completion of Tehri Project.

The Chilla region of the district is part of Rajaji National Park landscape and is very rich in flora and fauna. Small settlements of Van Gujjars are also present in the region. These Van Gujjars were rehabilitated here in the year 1976. The Van Gujjar is a trans- Himalaya nomadic community who spends summers in upper ridges of Himalayas while for winter comes to the lower ranges of Shivalik Hills. This rehabilitated community here has stopped moving to go Himalayas and have settled here. Agriculture and animal rearing are the main two sources of income. Presently the communities residing here are in conflict with the forest authorities, since forest authorities have stopped granting permits to them to go inside the forest or letting their animals graze on forest land. Traditional knowledge system of these people is deteriorating with time. The RCC houses are replacing the old thatch huts. The wooden work is not much visible and losing its prominence mainly due to restriction put by the forest people on cutting down of trees. Van Gujjars are still using herbs to cure illness of their cows and buffaloes here. Indeed they trust natural herbs over the veterinary's prescriptions. Although for themselves they prefer hospitals and not anymore go to the traditional way of using herbs. Some common herbs that they use to cure their animals are Kadvi, Padrish and Rimant for fever and illness.

Pic. 87.

Gujar women

The Chilla area is rich in Bio- diversity. It is a mixed forest with Sal, Oak Fig and other common trees of the region. Adjacent to river, the area has a suitable climate for Birds and Animals. Some common birds of this region are Himalayan Bulbul, Red Venture Bulbul, Brown Wood Owl, Great Flett Woodpecker, Great Pie Hornbill, Oriental Dollar Bird, Human Warbler, Western Crowned Warbler, Whistle Warbler, Oriental White eye and Brown fish Owl. Some commonly seen animals are Neel Gaya, Sambhar, Tiger, Leopard, Jungle Cat, Hyena, Jackal, Asiatic Elephant, Palm Civet, Sloth Bear, Yellow-throated Marten, Burmese Python and King Cobra. However due to pollution a major shift in the rainfall has been noticed here. Locals testify that the amount of water in the river has been reduced in recent years.

6.1 HAR KI PAIRI

A melting point of cultures, beliefs, temples and colorful Ghats, the ancient town of Haridwar has a significant history. Nearly all mythological accounts, travel records and epics establish Haridwar as one of the sites where one can get rid of all the past sins. Har Ki Pairi is the most revered site. Around 57 BCE, Emperor Vikramaditya, the Emperor of Ujjain got constructed the Ghats at Har Ki Pairi in the memory of his elder brother, Bhartari who meditated here on the banks of the Ganga. The mighty Mughals also contributed in the expansion of Har Ki Pairi. It was Emperor Akbar who appointed Raja Man Singh to undertake the restoration of Ghats. And in 1608 CE, Emperor Jehangir sent in his officials to organize the Kumbh Mela here.

Pic. 88.

Invocation to Ganga at Haridwar

6.2 KUMBHA MELA

The Kumbh Mela is known to be the largest religious gathering in the world that takes place only once in a cycle of 12 years, while in every six years an *Ardh-Kumbh* is organized here. People from all around the world comes to attend the festival. The most important part of the Kumbh is the element of a cosmic force called *amrit* or nectar. The dates of Kumbh mela are determined in accordance with the planetary positions, mainly of the Brihaspati (Jupiter) in relation to the Surya (Sun) and Chandra (Moon). The phenomenon that the Sun is behind the Moon in this phase and its heat and energy results in the release of the nectar generated in the Moon. The belief is that taking a dip in the sacred waters during the Kumbh brings the blessing of the nectar.
Kumbh melas are such occasions when millions take dip at sacred spots. In fact, the main reason for millions of pilgrims arriving to the Kumbh mela is **the bathing ritual** or the *snān*, also known as *dubki* (dip) in common language. Some of the common Snans on the occasion of Kumbh are I the list below.

S.N.	Name of Tithi	Date/Tithi
1.	Pausa Poorima	Full moon of Pausa Month
2.	Makara Sankranti	The day when Sun enters the sign of Capricorn or for Uttarayan
3.	Mauni Amawasya	Dark Moon
4.	Basant Panchami	Fifth day of the new moon
5.	Magha Poornima	Full moon or a full lunar eclipse
6.	Maha Shiva Ratri	The day Lord Shiva got married

Before British, the Kumbh Melas were managed by the akharas (sects) of religious ascetics known as the Sadhus. They collected taxes, and also carried out policing and judicial duties here. Now they come in numbers to attend the Kumbh Mela. The different sects have always a tussle among each other on taking the dip first. In 1796, the Shaivites sects attacked the Udasin sects in a similar tussle which led to violent clashes and resulted in a number of casualties.

6.3 KANWAD

Kanwad is another such occasion when devotees from other northern states comes to Haridwar to fetch water and dispense it as offerings to local Shiva temples in their vicinity. It is a kind of religious performance where devotees carry the water in big container on their shoulders suspended on either side of poles. Traditionally Kanwad used to be a walking activity where people walk day and night collect water than walk back to their respective places. However now the tradition of walking is losing its prominence and pilgrims prefer driving or coming in two wheelers rather than walking. Kanwad which pilgrims carry on shoulder were earlier used to be made on Haridwar only. But now very few individuals do the jobs. Although the containers and pole still assemble here but all the workers are migrated during the time of the season and once it gets over, they rush back to their places.

Pic. 89.

Kanwad Yatris filling in Ganges Water in Haridwar

6.4 RITUALS AT HAR KI PAIRI

Nearly every *sanskar* mentioned in Santana Dharma gets performed in Har Ki Pairi. From birth rites to death rites, people come to perform rituals here. Performance of different rituals on Har Ki Pairi is a usual site. There are specific Ghats related to many rituals. The Nai Ghat here is dedicated to barbers only who cut hair of infants and widows too. Everyday day thousands of people come here for Mundanes. There is also one Shamshan Ghat (cremation ground) not very far from Har ki Pairi. MahaBrahamans facilitate the rituals here. There is no visible caste barrier on the Samshan Ghat. The facility of electric cremation has also been installed here but people are reluctant to use the technology. The electric crematorium has been shut down for a while now. The rituals do not take place after sunset. The wood for the cremation is provided by the Van Nigam and also wood contractors from Jwalapur, Kankhal, Kaliyar.

6.5 KUSHA GHAT

The Kusha Ghat is a somber place used by people to immerse the ashes of their loved ones. Though, marriages also take places here. It is also believed that Sage Dattatreya prayed here who cursed Ganga after his entire belongings flood by the river. To calm the saint, the goddess sent back his belongings through her water. This is why people here believe that whatever devotees offer the Goddess here will come back through the water once and then need to be offer again. The Ghat was built by Ahilyabai Holkar of Indore.

Around this Ghat, many genealogists and record keepers of all Hindu families from across the sub-continent sits. They have books dating back several centuries. It documents the ancestral villages of the one and name of all ancestors with the signature of the one who has last visited and updated the records.

The Genealogists of Haridwar

Aniruddha Kumar Jha, a panda (genealogist) in Haridwar has maintained records of thousands of Hindu families from across India for 35 years in Devanagiri. Many of these ledgers are over 300 years old. Jha has been maintaining handwritten records of family members of the deceased since the age of 19. He normally sits in his 6 ft by 6ft office on the ghats of the Ganga River in Haridwar and writes them down on scroll. Owner of a hotel, Jha has done well to ensure his future generations are economically sound.

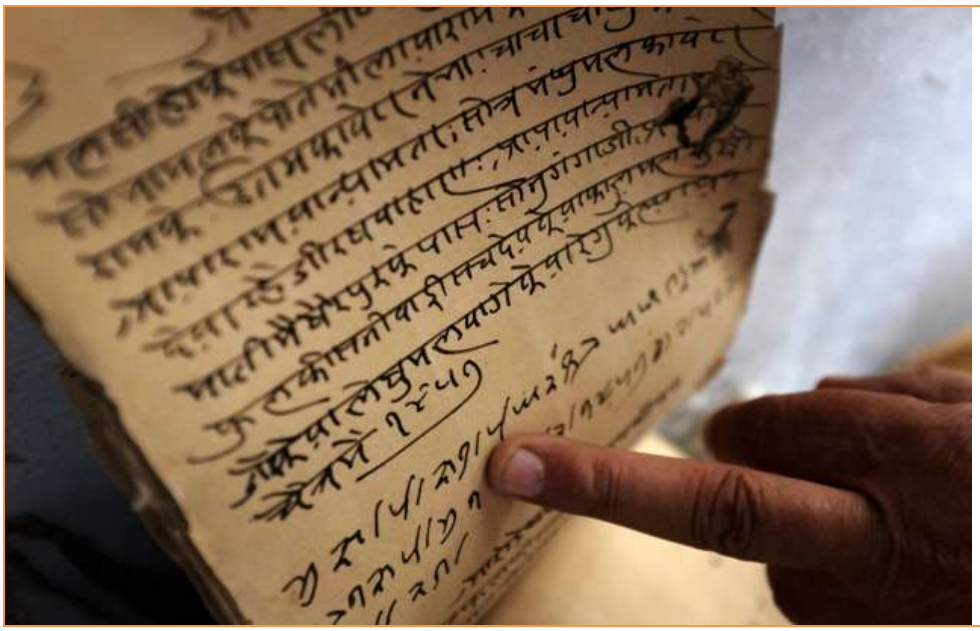
He is one of the 2,500 genealogists who regularly update family registers (bahis) of people who come to Haridwar to perform the last rites of their loved ones. Pandas are usually found at Har Ki Pairi, jotting down recent births, deaths, and marriages. A recent dip in footfall at Haridwar to perform last rites has prompted pandas like Jha to digitize death records. It won't be long before these handwritten records fade into oblivion. Soon, death records will be available online.

"Over the years, the custom of visiting Haridwar to update family ledgers is slowly dying," says Mahendra Kumar, a panda who has been maintaining records since the 1980s. "People are now moving abroad and forgetting about these centuries-old customs. Most of them do not even know the names of their great-grandfathers or their original ancestral village. If the records are digitized, people can access them online from any part of the world," says Kumar.

Most of these handwritten scrolls have been maintained by over twenty generations of panda, making it a popular family business in the region. Nowadays, pandas are in charge of designated registers categorized as original districts/villages of a particular family's ancestors.

Aniruddha, for instance, received the family scrolls of Bhagalpur, and from parts of Punjab and Haryana after his father decided to divide his possessions among his sons. "We have been in the business for over 14 generations and have bahis (ledgers) older than Tulsidas' Ramayana. Most of the older records were written on bhojpatra (leaves of the birch tree) and have been destroyed by moths. We have begun to transfer older records to new scrolls. A few pandas have even begun digitizing records and have thrown the old scrolls into the Ganga."

According to the Genealogical Society of Utah, USA, Hindu family records dating back to 1194 were once maintained by these Haridwar genealogists.



Pic. 90.

An 800 years' old scroll has handwritten data written in both Hindi and Urdu.

These records have been made available to family members on the society's website. In fact, the society has been maintaining these records since 1981. In a rare find, a record from 1264 was found recently in an old trunk in the ancestral home of Aniruddha in Jwalapur, which is about 8 kms from Haridwar.

For families who have converted to other religions, their records are not updated.
Lachhi Ram, who has been a panda for 26 years, said, "There was a time when people used to come to us to update their family ledgers in order to settle family and property disputes.
Things have changed now. Religious conversion and migration has reduced dependency on this process."

6.6 NANAK BARA

The place is one of the two places where an idol of Guru Nanak Dev has been consecrated here. The other place is in Pakistan. Every year, thousands of devotees comes here to seek his blessings. According to Sikh popular lore, this is the place where Guru Nanak meditated before travelling to Hemkund Sahib. Many devotees before travelling to Hemkund Sahib seek the blessings here.

6.7 KANKHAL

Kankhal is another place situated a distance away from Haridwar. Adorned with several majestic structures of 17th and 18th century, the town is on the bank of Upper Ganga Canal. Many sites built in Rajput and Mughal architecture decorated with beautiful wall paintings can be seen here. Havellis of Raja Bharmal and King of Patiala are definitely the most fascinating out of all the buildings. Many Akharas of different sects of Hinduism have also dotted the landscape of Kankhal.Like Haridwar, the town of Kankhal has been mentioned in sacred ancient texts. Indeed, believed to be older and significant than the town of Haridwar. It is the town believed to be the birth place of Sati, wife of Lord Shiva. According to Vayupuran, this is the place where Goddess Ganga tells Bhagirath that, "I am blessing the places I am flowing through but as I am flowing through Kankhal, I am the one being blessed".

This cremation ground, where several Hindus congregate to immerse ashes of the dead is well known. The sides of the precinct are surrounded by Shri Panchayati Akhara, Bada Udasin Temple and Raj Ghat. Though the site may be very old, the pavilion was constructed in 1952 A.D. The mythical story associates Kankhal and Shamshan Ghat with Uma Devi (Sati Mata). It is believed that a man achieves salvation if his cremation is performed at the bank of Ganga in Kankhal. This belief establishes the strong significance of Samshan Ghat of Kankhal. The entrance is through a rectangular gate having small *shikhara*, leading to an open court. It has religious tree and seating arrangements. The main entrance gate has colonnades on either side, which is used as a waiting area. It has flat roof with series of square pillars supporting the structure. Low heighted wall is constructed at the floor level that encloses the structure. A rectangular walled veranda is supported over rectangular pillars besides the riverside, utilized for funeral rites. Stone paved steps leading to the river connect it. The parapet includes a *shikhara.*

Pic. 91.

The cremation ground at Kankhal

6.8 TEESRE PAASE DA GURUDWARA

It is believed that the place of Kankhal, has been the site for the practice of Sati. And it was the third of Guru of Sikhism, Guru Amardas Ji who visited the place and stops the ill practice of Sati. Guru Amardas Ji visited the place 22 times and meditated here. The place where Guru Amardas Ji was built some 350 years ago and later Gurudwara built to mark the Guru's adobe. The building of site of meditation is built with bricks covered with lime Mortar. The openings have rectangular wooden frames and panels with multi façade arches. The inner chamber of the site has beautiful wall paintings, mainly depicting Krishna and people in Mughal attire. The one painting shows the image of Guru Amardas Ji and one shows his daughter helping other.

The Gurdwara serves *langar* (feast) every morning to everyone. And during the occasion of the anniversary of Amardas Ji. A Rath Yatra has been taken out and nagar kirtan is also organized here. Many devotees come and visit the Gurudwara. A big Langar is also organized to mark the celebration of the day. Pilgrims who travel to Hemkund Sahib also visits Gurudwara.

6.9 SATI GHAT

It is been believed that Sati Ghat is present since the immemorial times. Like Kusha Ghat, the people immerse the ashes of their loved ones. It's been stated in Vayupuran that the maximum time the ashes of a person stays in river Ganga till that many times the person gets to stay in heaven. The place is significant not because of the rituals but also the last point till the human figurine of Goddess Ganga follows Bhagirath. As per the legend, Goddess Ganga said Bhagirath that I will follow you till the time you do not doubt about my presence and the moment you doubt about me not following you, I will stop and from that place onwards only my water will follow you. So people here at Sati Ghat believe that human figurine of Ganga on the river existed till here only and the rest of the journey has no Goddess associated to it. In the rest of journey, it only symbolizes water nothing relates to the Goddess Ganga. The people also believe that because of the existence of Goddess till Kankhal, the water is pure and have healing qualities like it does not contaminate with germs no matter till how much time you store it in a container. However, downstream of Kankhal does not have these qualities of Ganga water till Gangasagar because the rest of journey is covered by water only not by goddess herself.

The ancient bathing *ghat* has its historic significance as in the past the *ghat* was used for locating the cenotaph of the Sati. The historic Samadhi exists on the site. In the present context when the practice of Sati is abandoned, the *ghat* is used for *asthi visarjan* or the immersion of ashes after cremation. People from across the world come to immerse the ashes of their dear ones. The existence of the spot is unique in itself as it is believed that the Samadhi of Sati are located on the spot which is enclosed near the Sati Ghat at the bank of river Ganga. Series of *Samadhis* or memorials are located at the ghat, whose architectural style and construction materials reflect the influence of different periods. Most of the *Samadhis* are constructed over an octagonal platform. They have low heighted walls surmounted with fluted domes with ornamental finial at top. A secondary road divides the *Samadhi* complex into two groups, which is enclosed with separate walls and iron railings. An old Banyan tree is located within the *Samadhi* complex. Some of the new *Samadhis* are constructed over square base and conical roof is constructed on top.

6.10 DAKSH MAHADEV TEMPLE

According to legend, this temple is located at the spot where King Daksh (father of Mata Sati) established the temple of Lord Shiva after realizing his universal power. This place is one of the most sacred religious spots for the Hindus. The original structure and the *mul prasada* would have been very ancient. The precincts, owing to their religious significance and surrounded by sacred sites as well as the banks of theGanga, make it very significant. The precinct comprises of various religious structures. Most of them have been renovated with modern materials and architectural styles. The historic character of the site has been destroyed due to insensitive interventions. Thesite comprises of a Shiva Temple, Maha Bidya temple, Hanuman temple and one *serai*. The site opens to the river Ganga at the rear through a *ghat*. A *yagyashala* and a Ficustree are located at the rear of the temple complex. Remains of the original temple complex in the form of bastions and boundary walls are visible in the North and northeasternpart of the campus. Originally the site was made of lime mortar and brick. Most of the structures have been renovated with modern materials. The walls constructed with lime mortar and *lakhori* bricks exist in very few places.

6.11 GANGA GHAT

The structures have been built in 1936 A.D., as inscribed over there. The sacred use of the Ghat and the immense religious significance of the precincts make it an important site. The building was constructed to provide shelter and resting area for saints. The *Ghat* has a rectangular pavilion that is supported by rectangular pillars. Series of steps lead towards the *ghat*. Sit-outs are located on the sides of the *ghat*. A Shiva temple is situated in the middle of the *ghat*. It has a square *garbha griha* which is surmounted with flat roof and *shikhara* in the centre culminating into ornamental *kalasha*. The earth surfaces of the *ghat* are surrounded with series of *pitris* all around. An old Pipal tree is located in the upper areas. A small Hanuman temple is located adjacent to the tree. Some *pitris* are enclosed with a structure following the style of temple. Remains of the domes of the *pitris* are visible in the surroundings.

Fig. 92.

Ganga Ghat at Kankhal

6.12 MAHARAJA PATIALA KI HAVELI

The Maharaja of Patiala built the *haveli* and later the structure was donated to Teesre Passe ka Gurudwara, next to the structure. One of the most revered Sikh shrines along the Ganga, Teesre Passa ka Gurdwara is a significant stopover en route ShriHemkunt Sahib in the mountains. The walls of *haveli* are constructed with *lakhori* brick and lime mortar. The surfaces are finished with

lime plaster. The openings have rectangular ornamented wooden frames and panels. Stone frames are used for the construction of openings. The main entrance is foliated with arches and intricate Ala-Gila work. The intricately carved doorframe and panel decorates the entrance. The walls are decorated with foliated arches in relief with thin ornamentalpillars. *Jharokhas*at the first floor with ornamental dome and carved bracket decorates the façade.

Pic. 93. Maharaja Patiala ki Haveli

6.13 GANGA MANDIR

Pt. Deendayal ji, in 1873 A.D., constructed the temple. It follows the typical architectural style of temples in the region. The entry to the temple is through a cusped arch gate and a rectangular ornamented wooden opening. It leads to the mandapa with the *garbha griha*, the shikhara is placed over *garbha griha* culminating into amalaka and kalasha. Replica of shikhras around the main shikhara decorates the temple. The stone *chajjas* are supported by carved stone brackets. It has an idol of Lord Ganesha on its four faces and a stone *chajja* is supported over stone brackets.

6.14 VIR BHADRA VEDVYAS MANDIR

The temple was built by a minister of Maharaja Ranjit Singh, later donated to his *purohit* (local priest) around 500 years ago. The architectural style of the temple follows the typical style of the region. The entrance is through a damaged gateway having a cusped arch and equilateral arched opening. Twin temples of Lord Shiva are situated on a twostep raised platform having a bastion on the edge. Both temples have *mandapa* and garbhagriha towards south side of the temple. A hemispherical dome is surmounted over the *mandapa* with *kalasha*, ceiling of dome has murals narrating mythological stories of God Ganesha and other events. The entry to the temple is through a cusped arch and low heighted door. The *garbha griha* has a *shikhara* over it and a statue of Nandi is placed in front of *mandapa*. Murals in the *mandapa* portray mythological stories of Lord Krishna. A cusped arch with slender pillars and niches on either side of the wall, create interest in the facade. A religious tree is also located here. An old well is located in the complex.

6.15 BHARAMAL KA BAGH

This site was developed as a garden by Seth Bharamal around 200 years ago. The entrance gate and the rooms within it were developed as a part of the whole site. The intricate decorative elements of structure and its grandeur represent a glorious past. It is an important landmark of Kankhal. The structure represents a rich combination of Garhwal and Rajput styles and is important to understand the cultural pot of Haridwar. The main entrance of thestructure is through a semi-circular arch. The

ground floor ofthe structure has niches on all the sides with Ala-Gila work, which depicts the stories of Gods and Goddess. First floor has small window openings following the same architecture of the decorative niches.

6.16 SANKAT MOCHAN HANUMAN MANDIR

According to the belief of local devotees this temple is 400 years old. Later on, Shri 108 Mauni Baba renovated it in 1946. The temple is a single storied structure, a rectangular door opening with steps leads to the courtyard, which is at a higher level. Rooms on three sides surround the courtyard. The *garbha griha* has a colonnade with a series of circular pillars. The *shikhara* is ornamented with replicas of small *shikharas* located at the base of the shikhara. A historic well is located in the courtyard. The space below the plinth height and ground level is used as a room for saints and pilgrims.

6.17 GURUKUL MAHAVIDYALAYA

Swami Darshananand Saraswati established the institution in 1908 A.D. as an Ashram for traditional education. The architectural style of the building represents the influence of late colonial period. The precinct is approached from an entrance door (Darshanaval Dwar), which is rectangular in plan. The central area has semicircular arched opening with small four *shikharas* at the top. It leads towards the precinct which has E–shaped college building. It is a single storied structure with double storied octagonal blocks at the center and in the corners. The front sides have veranda supported by square pillar. Ornamental low height pillars are constructed in the parapet wall. A residential block is located adjacent to the college block. The structures are located in different clusters all around the campus. An Upasana Mandir (meditation center) is located at the center. It is surrounded with small rectangular blocks. Small residential blocks are located in surrounding areas. A meditation center is located opposite to the college block.

6.18 PUL JAT WALA & OTHER STRUCTURES OF THE GANGA CANAL

Pic. 94.

Foundation Stone of Upper Ganga Canal

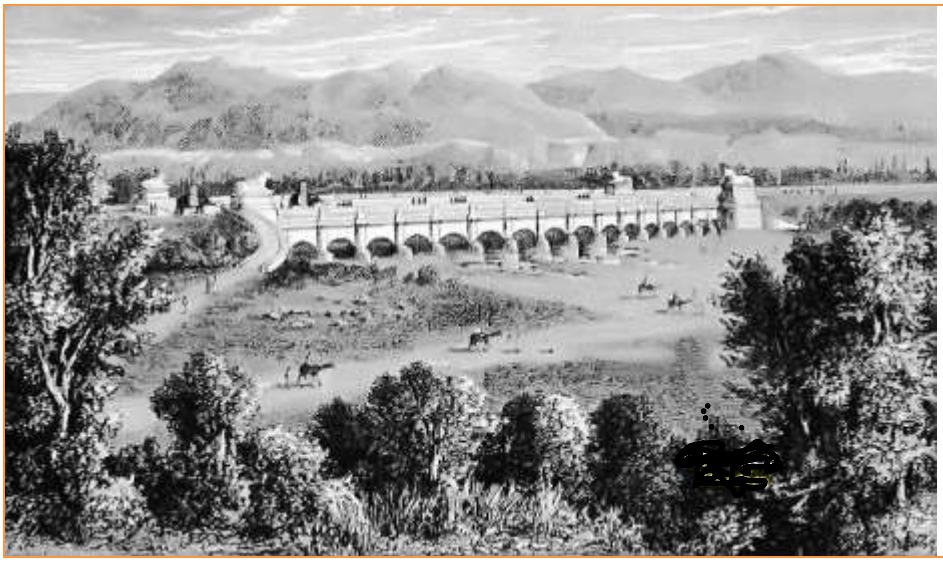
The bridge was constructed as a part of the Ganges Canal Project, undertaken by Leuitenant Colonel Proby Cautley.

At the time, the Ganges Canal was a marvel, a project of passion that saw many firsts in engineering in India.

Ganga Canal, a feat of human endeavor

The Ganga Canal is a unique gem of engineering heritage and extends right up to the national capital.

Running from Har-Ki-Pairi in Haridwar all the way to Kanpur, the Ganga Canal was a project that dwarfed its contemporaries like the much-hyped Suez Canal. That it was built in colonial India has led to its obscurity. Nevertheless, the magnificent Ganga Canal, running 4,800 kilometers (including the tributaries) is an architectural marvel that compares favorably with the Suez Canal, which at just about 193 km in length attracts millions of visitors annually. Many believe that after the Great Wall of China, the Ganga Canal is the only other manmade wonder visible from outer space.



Pic. 95.

Solani Aqueduct, a feature that lifted water against gravity.

(Source: Thomasson College, IIT Roorkee archive)

Time is perhaps ripe to restore our glorious heritage of irrigation systems and present them before the world. The story of the Ganga Canal is a very interesting one and is waiting to be told. The Ganga Canal, a dream project and lifelong passion of the British engineer, Sir Proby Cautley (1802-1871), was constructed from 1842 to 1854. He was dismayed that while floods in the Ganga killed thousands in one part of India, and in the other, people died of thirst. The canal was North India's first irrigation system consisting of a main canal 560 km long, with its branches and the various tributaries stretching to another 492 km. The canal irrigates 3,100 km^2 in 5,000 villages across the two states of Uttarakhand and Uttar Pradesh. To build such an architectural marvel, Sir Proby needed to train hydrologists and engineers and he set up Asia's first engineering college in 1845, the Thomasson College of Civil Engineering, Roorkee, which is today the IIT, Roorkee.

The sites along the canal are worth appreciating for their architectural ingenuity. The Canal hides several interesting stories and heritage elements like the 150-year-old locks of the canal, water mills and bridges. The lion sculptures of the Ganga Canal are still recognizable elements of a rich albeit crumbling heritage.

Another marvel of engineering along the canal is the Solani Aqueduct, India's first. While building the canal, Cautley realized that Solani, downstream of the Ganga was about 25 m higher than Hardwar. He built an aqueduct that gently took the flow of the mighty river, against the flow of gravity. The Solani aqueduct is a masterpiece waiting to be discovered.

The immensity of the project can be judged from the fact that the first ever railway engine to run in India was brought from England and ran between Piran Kaliyar and Solani in the December of 1851. The Mumbai-Thane rail link, considered India's first, came much later. The Jenny Lind, as the engine was affectionately called, still stands proudly (but neglected) outside the Roorkee Railway Station.

The site is also a route for migratory birds flocking to the Ganga and Yamuna wetlands. The landscape offers several opportunities for walking, cycling and boating tours along these natural and lush areas.

For a natural and historical site that is so close to New Delhi, the national capital, the site can attract weekend tourism too. The Ganga Canal is, thus, a ready showcase of India's history of irrigation.

6.19 BRITISH CEMETERY AT GANESHPURI

An old site, ASI protected. This is a vast cemetery having 33725 sq m area (3372 Hectare/7.623 Acres) with a regular compound wall, pierced with an entrance gateway having a pointed arch of the Gothic style. The cemetery contains a number of graves including graves is of general Sir Harold Williams of different designs and materials belonging to mid nineteenth century. A part of the cemetery is still use as graveyard by Christian community of Roorkee.

Pic. 96.

The Lych Gate of the Cemetery

6.20 JAMA MASJID

The architectural style of the building represents the Colonial period. It is said to be built at the dawn of the 19th century. The Masjid is surmounted with triple dome; the central dome is bigger in scale. The domes are decorated with vertical flutes and ornamental finial. Ornamental minarets are situated on the north and south side of the structure. The main chamber of Masjid has a verandah in front that is a double-storied structure. Semicircular arches and circular pillars support it. The double height of the central area is decorated with ornamental *bangla dhar* roof that is surmounted with small domes. An open area is situated in front as the open court. The court is surrounded with rectangular blocks and veranda in front.

6.21 MASJID KOT NAFISI

Jagirdar Jamaluddin Khan Pundir built the mosque in 1253 A.D.; the Dargah of Amirullah Shah Sabri is also located in the precinct. A narrow path from Katra Bazaar leads to the courtyard through a cusped arch gateway, having an equilateral arched wooden opening and small minarets. The mosque is located on the west and Masjid is towards the east side of the courtyard. The Masjid is rectangular in plan having a hemispherical dome and rectangular minarets on top. The veranda is a later addition. The mosque has three equilateral arched openings supported over octagonal pillars. There are three lotus petals, late domes over the hall with octagonal minarets at the corners. They have an onion shaped dome and series of small semicircular arched opening surrounds the minarets.

6.22 NATURAL HERITAGE IN THE HARIDWAR STRETCH

1. **Barasingha**:
    a. Commonly known as Swamp deer (*Cervus duvauceli*), are restricted to some swamp wetland forests. It is a medium sized deer species reaching upto 130 cm and weighing 180 kg.
    b. The antlers of an adult male Barasingha can grow up to 75cm long and can have more than 12 points. Hence, the name Barasingha.
    c. Habitat: The Barasingha prefers tall grass and reed beds near rivers. Marshes or swampland is a Barasingha's preferred territory.
    d. Important in Jhilmil Jheel Conservation reserve, the first conservation reserve in the country. The terai landscape includes short and tall grasslands, tropical mixed moist deciduous forests, and secondary scrub.
    e. It is estimated that there are less than 5000 Barasingha worldwide. There are three sub species of Barasingha found in India.
    f. IUCN Status - vulnerable
2. **Sal**
3. **Sain**
4. **Rohini**
5. **Amla**
6. **Asiatic Elephants**
    a. The Asian elephant (*Elephas maximus*), also called Asiatic elephant, is the only living species of the genus *Elephas*. Three subspecies are recognised—*E. m.*

maximus from Sri Lanka, *E. m. indicus* from mainland Asia and *E. m. sumatranus* from the island of Sumatra.

b. An elephant's trunk is actually a long nose with many functions. It's used for smelling, breathing, trumpeting, drinking, and grabbing things—especially a potential meal.
c. Elephants are widely viewed as one of Earth's most intelligent animals. They have a highly evolved neocortex, similar to humans, great apes, and some dolphin species.
d. In the wild, female elephants, called cows, live in close-knit family herds with their young, but adult males, known as bulls, tend to roam on their own. Elephants have a longer pregnancy than any other mammal—almost 22 months.
e. Almost a third of Asian elephants live in captivity, largely in Thailand, India, and Myanmar. they're used in the tourism industry, where many are trained to perform in shows, gives rides, and interact up-close with tourists.
f. IUCN Status: endangered

7. **Medicinal Plants**:
    a. Catharanthus roseus hinn
    b. Ocimum Spp
    c. Asparagas racemosus
8. **Barking deer**:
    a. Muntjac or barking deer is a member of deer family. There are 12 species of muntjac that can be found. Muntjac can reach 31.5 to 39 inches in length and 24 to 35 pounds of weight.
    b. Muntjac has small, stocky body and slender legs. Body is covered with reddish-brown coat. Patches of white hair can be found on a chin, throat, belly and tail. Black stripe stretches along the back side of the body.
    c. Muntjacs have excellent eyesight and sense of hearing. These senses are mainly used for detection of predators. Muntjacs are crepuscular animals (active at dusk and dawn). They are occasionally active during the night.
    d. Muntjacs produce barking sound in the case of danger (to inform other animals) and during the mating season (to find mate). Because of that, muntjacs are known as barking deer.
    e. Pregnancy in females lasts 7 months and ends with one or (rarely) two babies. Baby is covered with white spots which provide camouflage in the first days of life. Young animals depend on the mother's milk during the first two months of their life. At the age of 6 months, muntjacs begin independent life. They reach sexual maturity at the age of 6 to 12 months.
    f. Muntjac is the oldest species of deer. It exists on the planet at least 15 to 30 million years. Muntjac can survive up to 17 years in the wild.
    g. IUCN Status: Least concern

9. Sambar deer

a. The color of body is dark or light brown with a yellowish or greyish tinge. The under parts are paler in color. Old tend to become very dark brown, almost black. They have a coarse coat of short, dark hair with lighter brown to creamy white hair on their undersides. The hairy coat is generally consistent in color around the body but can vary from yellowish-brown to almost dark grey.

b. The weight of adult Sambar is between 100 to 320 kg. Head to body length measures about 150 to 270 cm. The length of tail about 15 to 30 cm. They are about 100 to 150 cm high at the shoulder. Male sambar has unique stout and rugged antlers. They are fairly shy and nocturnal in nature.

c. Their breeding period is mainly during the months of November and December. In this period, male deer guard their rutting territories and try to attract the female deer through vocal and olfactory displays.

d. The male often sprays his body with urine and, standing erect on his hind legs, rubs his odour on trees. Due to regular wallowing in wet spots, the male is usually covered with mud, accentuating his dark fur, and he often acts aggressively during this time. Courtship is based more on tending bonds rather than males vocally advertising themselves. At the time of mounting, males do not clasp females.

e. The front legs of the male hang loosely and intromission takes the form of a "Copulatory jump". Females usually gives birth to a single calf after a gestation period of about 8 to 9 months. The young begin to take solid food at 5 to 14 days and begin to ruminate after 27 to 35 days. The average lifespan of sambar is between 16 to 20.

f. IUCN Status: Vulnerable

10. **Nilgai**:

a. *Nilgai* is the Hindustani word for "blue cow," which describes the blue-gray of adult bulls. he nilgai's conformation, however, is more horselike than cowlike: it has a long neck with a short upright mane, a bony narrow head, a barrel-like chest, strong legs, and high withers sloping back to the croup.

b. Mixed feeders, they prefer grass but also browse acacias and other trees and like flowers and fruits. They will stand on their hind legs to browse as high as possible. Extending the usual morning and late-afternoon feeding peaks, nilgais often begin eating before dawn and keep feeding after dark. They drink regularly during the hot season but can go two to three days without water in cool weather.

c. The nilgai is only moderately gregarious. Herds of 10 or fewer are usual, and groups of 20 or more are exceptional. The sexes remain separate most of the time, and only one mature bull in either a bachelor or female herd is the rule.

d. There is a mating peak in November and December, but calves are born in almost every month, after a gestation of more than eight months. Over half of nilgai births are of single calves, but triplets are not uncommon. Calves spend a month in hiding before beginning to accompany their mothers.
e. IUCN Status: Threatened

11. **Leopard**:
    a. Leopards are graceful and powerful big cats closely related to lions, tigers, and jaguars. Leopards are strong swimmers and very much at home in the water, where they sometimes eat fish or crabs.
    b. Leopards can also hunt from trees, where their spotted coats allow them to blend with the leaves until they spring with a deadly pounce. These nocturnal predators also stalk antelope, deer, and pigs by stealthy movements in the tall grass. When human settlements are present, leopards often attack dogs and, occasionally, people.
    c. Female leopards can give birth at any time of the year. They usually have two grayish cubs with barely visible spots. The mother hides her cubs and moves them from one safe location to the next until they are old enough to begin playing and learning to hunt. Cubs live with their mothers for about two years.
    d. Most leopards are light colored with distinctive dark spots that are called rosettes, because they resemble the shape of a rose. Black leopards, which appear to be almost solid in color because their spots are hard to distinguish, are commonly called black panthers.
    e. IUCN Status: Threatened

12. **Bengal Tiger**:
    a. Bengal tigers live in India and are sometimes called Indian tigers. They are the most common tiger and number about half of all wild tigers. Over many centuries they have become an important part of Indian tradition and lore.
    b. Tigers live alone and aggressively scent-mark large territories to keep their rivals away. They are powerful nocturnal hunters that travel many miles to find buffalo, deer, wild pigs, and other large mammals. Tigers use their distinctive coats as camouflage
    c. Despite their fearsome reputation, most tigers avoid humans; however, a few do become dangerous maneaters. These animals are often sick and unable to hunt normally or live in an area where their traditional prey has vanished.
    d. Females give birth to litters of two to six cubs, which they raise with little or no help from the male. Cubs cannot hunt until they are 18 months old and remain with their mothers for two to three years, when they disperse to find their own territory.
    e. There were eight tiger subspecies at one time, but three became extinct during the 20th century. Over the last 100 years, hunting and forest destruction have reduced tiger populations from hundreds of thousands of animals to perhaps fewer than 2,500. Tigers are hunted as trophies, and also for body parts that are used in

traditional Chinese medicine. All five remaining tiger subspecies are at-risk, and many protection programs are in place.

f. IUCN Status: Endangered

13. Butterflies

a. Yellow orange tip
b. White orange tip
c. Common jezebel

Pic. 97. Nilgai

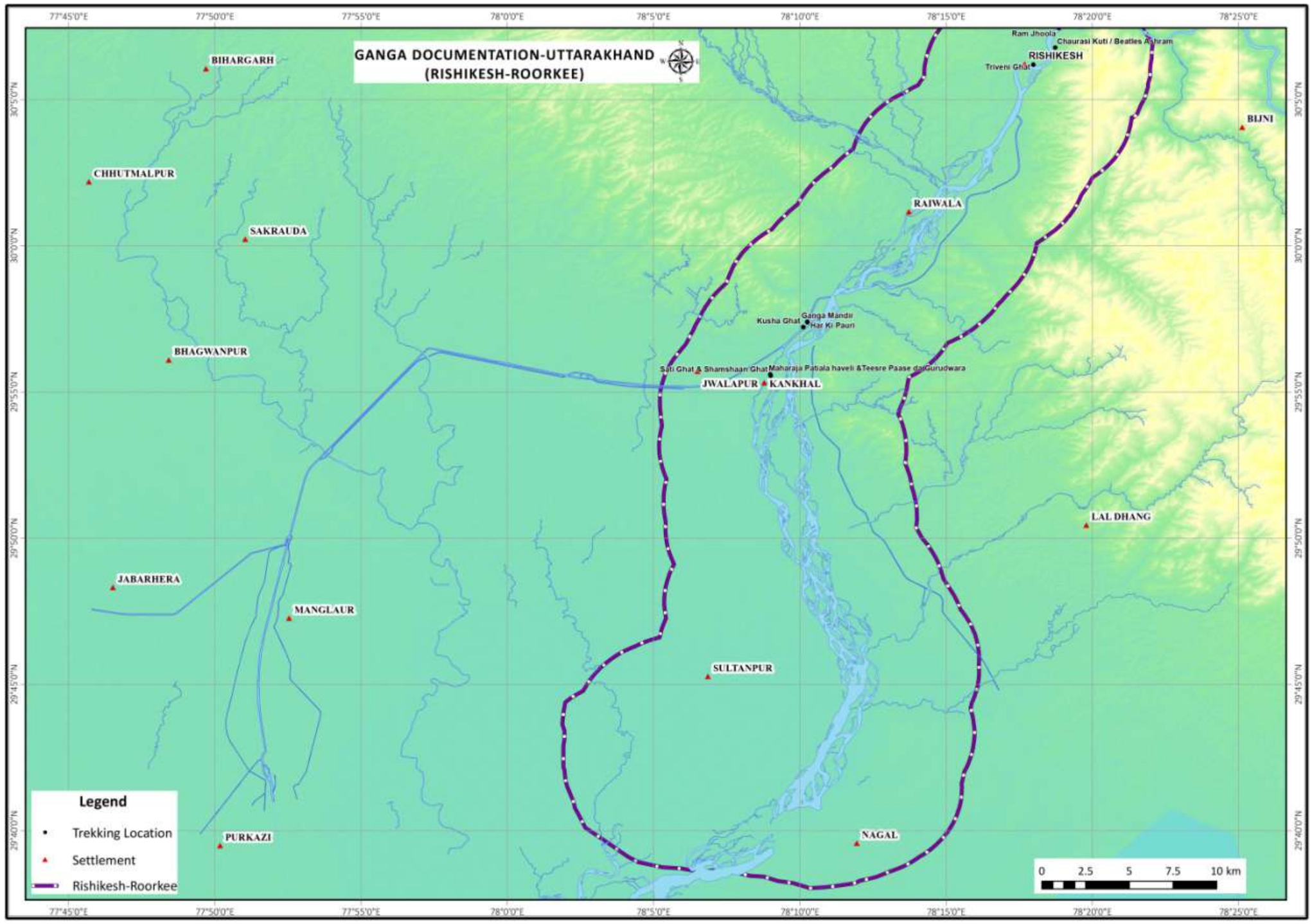
Pic. 98. Leopard

Pic. 99. Bengal Tiger

Pic. 100. White Orange Tip

Pic. 101. Amla Tree

Pic. 102. Sambar Deer



Map 10 : Overview Map [Rishikesh - Roorkee]

7. OVERVIEW OF NATURAL HERITAGE OF THE GANGA REGION IN UTTARAKHAND

Ecological studies have proven that there is a correlation between species diversity and eco system stability as well as productivity (Odum, 1953; Mcarthur,1955; Elton, 1958; Gardner & Ashby, 1970; May,1973). In effect, ecosystem stability depends on the ability of communities to contain species, or function groups, that are capable of differential response, and the greater the species diversity of a biological community, the lesser the risk of ecological collapse (Palmer et al., 2010; Mellin et al., 2014).

Additionally, ecoregional species richness and riverine productivity have also been found to be positively correlated (Duffy et al., 2007; Mclyntre et al., 2016). Unless appropriate actions are taken to maintain this diversity, ecosystem processes will be disputed (Pressey et al., 2007). Decline in the species diversity will lead to reduced ecological stability and productivity and, ultimately, to ecological collapse (Mellin et al., 2014), severely affecting human well-being (Field et al., 2011).

With increasing evidences of the ecological, economic and social losses associated with the loss of aquatic systems, especially rivers (Vorosmarty et al., 2010), conservation planners are turning to solutions for ecological restoration of rivers (Lake et al., 2007; Palmer et al., 2004). There are many theories and physical measures (single species focus, channel re- configuration and in- steam habitat improvement) related to restoration. However, the concept of the restoration of an entire steam or river ecosystem by restoring its biodiversity is widely accepted (Lake et al., 2007; Palmer et al., 2010).

The aim of the ecological restoration is to enhance the biodiversity and the resultant ecosystem services (Palmer et al., 2007). Maintenance of habitat, connectivity seasonal flow variability, augmenting habitat suitability and addressing issues related to unsustainable resource use are some of the parameters of successful ecological restoration of a river or a stream that are seldom seen in the restoration process (Lake et al., 2007).

The Aichi targets of the Convention on Biodiversity have set priorities for threatened fresh water taxa occurring outside the present global PA network (Raghvan et al., 2016). However, success would depend on science-based systematic conservation efforts at the national, state and local levels. Systematic planning requires prioritization of selected stretches of a river on the basis of their biodiversity and habitat suitability through participatory planning and collaborative implementation of strategies, decisions and actions that secure the long-term survival and favorable conservation status of biodiversity (Kukkala & Moilanen, 2013). However, owing to the incomplete biological information available for any riverscape, setting conservation priorities is a challenging task (Scott et al., 1993; Noss et al., 1997). Nevertheless, the fragmented of the riverscape and the high degree loss and fragmentation aggravates the urgency to conserve remaining habitats, the refuges that can act as repositories of source population.

To address these problems, conservation planners have developed alternative methods to identify and prioritize conservation areas. A common approach used to prioritize conservation areas involves identification of umbrella species and their habitat requirements. Conservation areas are selected on the basis of existing and potential habitats of the umbrella species and the connectivity among those habitat patches: which in turn would provide sufficient habitat variability to confer protection to

alarge number of naturally co-occurrent species of conservation interest (Launer & Murphy, 1994; Berger, 1997; Martikainen et al., 1998).

Most of the freshwater conservation literature availablefocuses on systematic, strategies and landscape-level planning through the declaration of fresh water of PAs (Saunders et al., 2002; Kingsford et al., 2005; Abell et al., 2007), which in principle should take into account the catchment characteristics of the river basin (Abell et al.; 2007). This approach, although coherent, is not practical for river basins with high human densities where social and economic constraints exist, and it is not feasible to all areas (Nel et al., 2009). Therefore, the question arises as, how to conserve the fresh water ecosystem in these densely populated areas, where the majority of the population lives in perpetual poverty and is highly dependent on the resources of the river.

The following species were noticed, on personal observation, in literature and in conversations with people living along the river:

7.1 **OTTER** (Lutrogale perspicillata)

Otters form a well-marked group, representing the family Mustelidae. They are mammals adapted for semi aquatic life. They are the principal predators of aquatic environment and indicators of the health of wetland or riverine ecosystem as they are sensitive to degradation along the food chain and habitat (Erlinge, 1972; Kruuk et al., 1993; Mason & MacDonald, 1987). Others are top predators of aquatic ecosystem and shape the faunal species composition of the ecosystems they inhabit.

Of the 13 species of otters worldwide, five species occur in Asia, and three of them are found in India; including the Ganga River basin. Otters usually live in low densities, are elusive and are largely nocturnal, thus making direct sightings difficult (Hussain, 2002). Hence, most of the studies on otter distributions are based on occasional sightings supplemented by indirect evidence of presence.

During the rapid biodiversity assessment, the presence of otters was confirmed on the basis of direct sightings and indirect evidence such as footprints and spirants. In the upper stretch of the Ganga River, indirect evidence, downstream of Devprayag, and direct sighting of group of smooth-coated otters in Rajaji National Park downstream of the Bhimgoda Barrage confirmed the presence of smooth-coated otter.

7.2 HIMALAYAN PAA FROG (Nanorana Vicina)

The species is a medium sized frog (58 mm), with olive and brown color body. It is listed as Least Concerned in the IUCN Red List.

The Himalayan Paa frog is associated with high-altitude streams, springs, fountains and other running water within open forests and grasslands habitats. The threats faced by the species are currently not known, but habitat destruction is presumed to be one of them.

It is mainly reported from the upper stretches of the Ganga River, from elevations of 2000-3000 meter above sea level.

7.3 ANNADALE'S PAA FROG (Nanorana Annandalii)

The species is listed Near Threatened in IUCN Red list. It is medium sized species (55 mm). It is olive colored, with marbling and a white-colored belly. It is distributed in the upper stretches of the Ganga River between 1500m to 2000m above sea level. This frog is found in rocky streams and brooks in mountain forests and in pools in forest clearings. Stream modification due to bolder collection and dams are major threats.

7.4 NEPAL PAA FROG (Nanorana minica)

This species has a relatively small sized body (28- 41 mm), with a brownish color, with black spots and small warts at the back of the body. This frog is found only in mountains sub- tropical forest and streams.

The distribution of the species is highly fragmented and is restricted to northern India. It is listed as vulnerable in the IUCN Red List. Habitat loss through dam construction and pollution are the major threats to the species. In the Ganga River, it is reported from the upper stretch, from 1000 to 2400 meters above sea level.

7.5 CASCADE FROG (Amolops formosus)

The cascade frog is a large sized frog (75 mm), with a green color body with the dark brown or black spots. It is Listed as Least Concerned in the IUCN Red List.

Cascade frogs are obligate stream dwelling species, associated with streams and riparian vegetation and breed along fast flowing waters. Their tadpoles have ventral suckers, using which they attach themselves to rocks in fast flowing streams. Changes in river hydrology caused by dams and deforestation are major threats.

The species occur in the upper stretch of the Ganga River between 1000 and 2500 meters above sea level.

7.6 MARBLED TOAD (Duttaphrynus stomaticus)

This species is moderately large bodied (76 mm). It is light brown in color, with numerous marblings. A large parotid gland is present behind the eye. The marbled toad is found in grasslands, scrubland, forest, agricultural land and human habitations. It breeds in both permanent and seasonal pools, seasoned streams and slow- flowing streams. It is listed as Leas Concern in the IUCN Red List. Threats to the species include habitat loss and water pollution due to pesticide and herbicide use in agricultural lands. It is distributed in the upper, middle and lower stretches of the Ganga River.

7.7 GOLDEN MAHASEER (Tor putitora)

Found in streams and rivers of montane and sub- montane regions, Tor putitora is a major tor species of the middle- hill stretches of the Himalayan region. The species is listed as Endangered in the IUCN Red List and has a declining population trend. Its habitat is rapid streams with rocky

bottoms, riverine wetlands and lakes. Threats to the species include overfishing, the use of modern fishing techniques and alteration of habitats. The species was once abundant in Uttarakhand, (Stevens, 1905) and was also reported from the Song- Ganga confluence (Dhu, 1923). During the rapid biodiversity assessment, T. putitora was recorded from the upper stretch of the Ganga River.

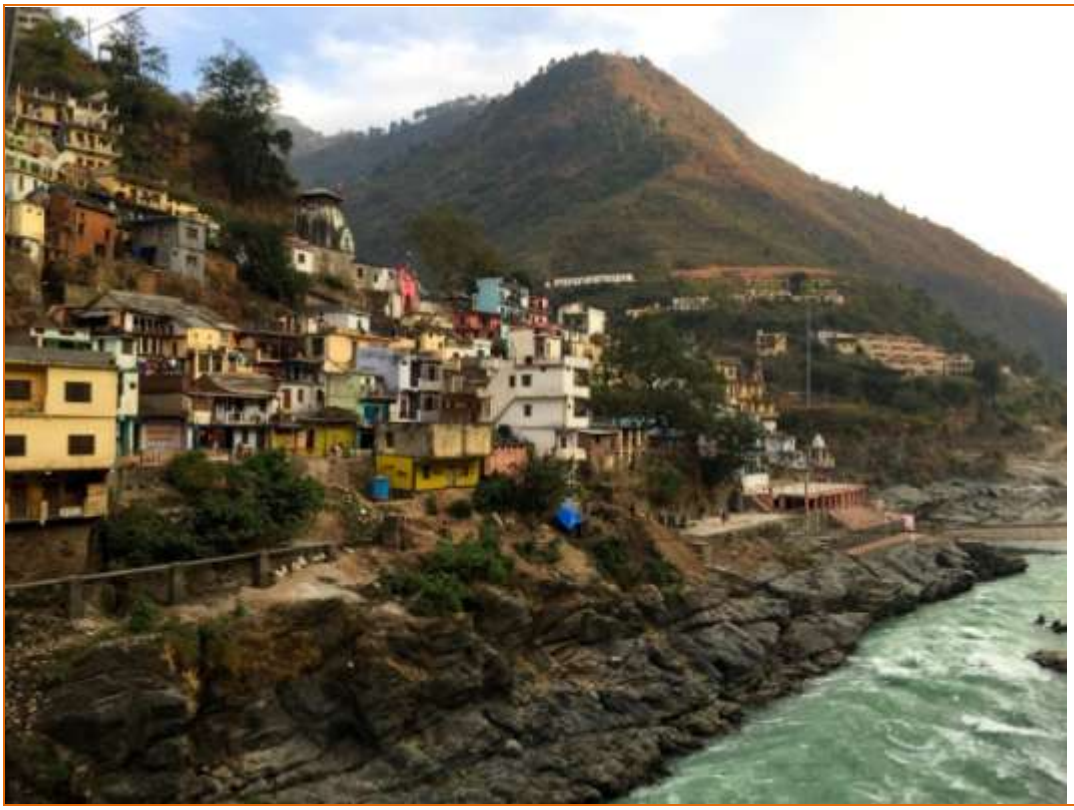
Pic. 103. Indian Bull Frog

Pic. 104. Golden Mahaseer

Pic. 105. Himalaya Paa Frog

Pic. 106. Minor Carp

8 DEVPRAYAG TO RISHIKESH (GANGA STRETCH)



Pic. 107.

Temple, Ghats and Ganga at Devprayag

This is 61 km stretch between Devprayag and Rishikesh in Uttarakhand. This stretch fells under the West Himalayas biogeographic provinces and is characterized by rapids with rocky bottoms, deep gorges and gentle slopes. The local communities in this region are dependent on the Ganga River for domestic water usage, their livelihoods from religious and adventure tourism and fishing.

Biodiversity value and ecological significance:

- The stretch nurtures about 56 species of fish including the Endangered Golden Mahaseer. Semi-aquatic mammals such as the smooth-coated and Eurasian otters have been reported from this stretch. There are also reports of Asian small- clawed otter from the narrow streams joining Ganga River. 41 waterbird species were recorded at Rishikesh barrage during migratory water bird survey. About 93 phytoplankton, 76 periphyton and 19 zoobenthic species that form important components of the food web have been recorded from this zone.

- The stretch along with the tributary Nayar River provides breeding ground for the Golden Mahaseer.

- This stretch forms the headwaters for the lower stretches of the Ganga River.

- Riffles and pools provide habitat heterogeneity for the benthicflora and periphyton and forms headwaters for the lower stretches of the Ganga river.

8.1 CHANDRABADNI SACRED LANDSCAPE

Pic. 108.

Chandrabadni Temple and the sacred hill

The Chandrabadni Mountain landscape, another Siddha Peeth, on the border of Tehsil Devaprayag and Pratapnagar in Tehri Garhwal district is well known for the temple of Chandrabadni Devi. The goddess associated with the temple is Durga Mata Sita (wife of Lord Shiva and daughter of Daksha Prajapati), considered as one of the famous deities in Garhwal Himalaya. The area viewed from the top of the temple is considered sacred and stands under a good influence by the deity. Said area consists mostly of dense oak forest on all sides of the mountain and is rich in biodiversity. Besides the Chandrabadni shrine, there are shrines to Jagdambeshwar Devta, Ulkeshwari Devi and Anusuya Devi.

GEOGRAPHY & ECOLOGY

The sacred shrine lies on top of the mountain Chandrabadni (historically Chandrakut) an altitude of 2.277m above sea level. It is approximately 10 km north of Kandikhal, 32 km from Deoprayag and 109 km from Narendra Nagar. The temple is approached through a paved trekking pathway from Jamnikhal. On a clear day, a part of the Himalayan range can be seen from the top. The peaks visible are Surkanda, Kedarnath and Badrinath.

A study of vegetation status and plant diversity at Chandrabadani forest reveals a total of 89 species, belonging to 38 families. 82 genera were recorded in the studied forest. Out the total species, 23 were found in tree layer, 29 under in shrub layer and 37 species were found in herb layer. The species richness was found higher in moderately and highly disturbed stand. Tree density was recorded maximum at the undisturbed stands followed by moderately and highly disturbed stands while the shrub density was observed greater at moderately and highly disturbed stands. Diversity

indices among all disturbance stands showed greater values at moderately and highly disturbed stands.

The climate is sub-tropical, with a three-season cycle of rainy (June-September), winter (October-February) and summer (March-June). Due to the elevation, snowfall is possible on the hilltop during winters.

ECONOMY & SOCIETY

The local population is generally dependant on agriculture. The major crops grown are wheat, rice, maize, mustard, barley, ginger, potato and pea (among others).

Deities of both genders are worshiped in the area. However, people think feminine deities are stronger as compared to male deities. There is no hard discrimination among genders and both male and female groups can participate in the worship. Yet people are of different opinions regarding the entering of women undergoing their menstrual cycle. There are strict rules and regulations to be followed during worship. The worship in Chanderbadni can be conducted only by Brahmins of the Pujar village. Other people can perform activities such as drumming, cleaning and other works at the temple.

MYTHS & LEGENDS

The myth of Chandrabadni Siddha Peeth is part of the story of goddess Sati, the first consort of Lord Shiva. She is the daughter oh Daksha, who is in turn one of Lord Brahma's sons. Many versions exist on the *yajna* (sacrifice) organised by Daksha, which leads to Sita's self-immolation and the creation of the various Shaktipeethas. This multitude of stories and interpretations reflects the diversity of (especially vernacular) Hinduism.

One version is written on a marker by the Uttarakhand Tourism Department, to be seen when starting the climb towards the temple (figure 3). Therein Daksha did not invite Sita's husband, Lord Shankar (Shiva), to the sacrifice in Haridwar out of pride. In other sources there is also mention of Daksha disapproving of Shiva as a respectable husband to his daughter. Sita wanted to attend the sacrifice herself but her husband forbade it. Unable to control her emotions, Sita went anyways and upon finding out that there is no place reserved for Lord Shankar, she sacrificed her destroyable body in the fire out of rage. In other sources, this process is described as Sati transforming in her rage to the celestial form of Adishakti, being the goddess of all energy and power. Thereby she terrorized all the guests and with her radiance and heat she set the body of Sati on fire. In the second part of the story, Shiva came to know of what happened to Sati and his anger knew no limits. He destroyed the sacrifice and beheaded Daksha. With Sati's body over his shoulder, he moved towards the mountain Kailash, while the whole universe was shaking under his rage. All the gods became rightfully worried and so it was Lord Vishnu, who used his Sudarshan Chakra (sharp-edged spinning wheel) to cut Sati's body into 51 pieces to end Shiva's rage. In other sources, the all-forgiving Shiva gave back life to all his victims, even Daksha, whose head was replaced with that of a goat. The body pieces fell all over the country and wherever they hit the ground, they were enshrined as a Shaktipeetha (a seat of Shakti, the female energy). It was Sati's torso which fell on the hill Chandrakut, which thereafter was called Chandrabadni. Sati's weapons are said to have fallen here alongside her torso, which explains the many *trishuls* (tridents) seen around the shrine.

The Pandit present at our time of visit underlined the power of Sati's torso, which is said to be stored above the temple sanctorum to this day. During the time of the temple's creation, anyone who worshipped Sita went straight to *samadhi*, an advanced state of consciousness normally reserved for advanced *yogis* and gateway to *moksha*. For fear of a devastating effect on society, if that many people would reach that state, Lord Shankar lifted the torso up and used an instrument to stabilize it and contain its energy.

Traditionally, a cloth canopy is tied to the ceiling over the *shri-yantra* once a year and the Brahman priest doing it has to do it blind-folded. As per the belief, *pujaris* (temple caretakers) come from only one village, i.e. Pujar Village. Goddess Chandrabadni is also considered as the *kul* Devi or clan goddess of this village.

Pic. 109.

View from Chandrabadni Temple

In the south of the temple, at about 3 km distance amid dense forest, is located the temple of God Bhiarava, which is also known as one-legged Bhiarava. According to the myths, the one-legged Bhiarava is present there as protector of Chandrabadni goddess, in meditation state. During the snowfall, the signs of footprints appear around the temple. The temple here is very small and contains a *shri-yantra* carved out on a flat stone instead of any idol. As at Chandrabadni, a cloth canopy is tied to the ceiling over this *shri-yantra* once a year and the Brahmin priest does this blind-folded.

Jagdambeshwar temple (Shiva temple) is in the village Jamu/Ravigram in the Ukhimath block of Rudraprayag district. Surrounded by forest, it is situated near the village, 2 km on motorable road, and visited throughout the year. It is said that the saint Shri Jagdambeshwar worshiped Shiva at this place. His wife Renuka was also with him and the stream flowing from the north of the temple is known as Renuka. Lord Shiva appeared before Jagdambeshwar on this site, and therefore this is also known as Shiva temple. Along the Shiva temple, the forest encompasses other religious places such as Chandika Devi temple, Morkajad, Narsingh Devta and Naketal. The belief for the conservation is that the source of water to this place is from Trijuginarayan, and all the goddesses and gods from distant places (Kedarnath and Badrinath) come to this place to take a holy dip in the waters. Before taking a bath, they must cross the Morkajad (a group of trees considered sacred) to reach Naketal. Naketal is situated at the top of this forest and is believed to be a home of Nag Devta.

According to myths, Ulkeshwari Devi had warned the people before Garhwal was occupied by Gurkhas. Her temple covers a cluster of many villages. People of different castes and statuses reside in these villages, but there is a strong belief regarding this deity as there is no difference in the faith. The Anusuya Devi landscape is situated in Dasholi Block/Mandal Range of district Chamoli. The Temple is situated away from main road of Mandal on 5 km of foot track, which is also en route to Rudre-Tung Himalaya. This landscape is considered as protected, because of the presence of temples of some sacred sites like Anusuya Devi temple, Attramuni ashram, Amdar Devta temple, and Dodga Devta. Maharishi Attri, who is one of the seven saints among great Maharishis after Kashaf, Ustreey, Jagdambeshwar, Bharadwaj, Visha Mitra and Gautam. The temple of Anusuya is famous as most of puja (worship) is carried out therein.

It is said that once Maharishi Attri was very thirsty, making Devi Anusuya pray to the goddess Ganga, and Ganga changed its direction and moved upwards towards Maharishi in the form of a spring, which is known as Amrit Ganga, and the place where the water falls near the cave is known as Amrit Kund. According to Hindu mythology, on one day, the wife of a Brahmin named Kaushik showed her determined duty to save her husband's life from the curse given by Mandakya Muni. She did not allow the sun to come out for seven days, and the earth was in darkness by her action. The life on earth was not running normally and at last by the request of goddesses Anusuya, life was brought to normality. The Temples of Gandiyal Devta, Bhairav Devta and Bhagwati Devi exist within these forested patches. In Gandiyal Devta temple, worship is offered twice a year: Once before the sowing of agricultural crops, and secondly during the harvesting period. The first harvest is offered to the deity, whereas in the Bhairav Devta temple, worship is offered throughout the year. These three temples are situated on different corners of this forest and are believed to be its caretaker.

FESTIVALS

The organization and celebration of fairs and festivals has preserved the traditional and socio-cultural heritage of the region to a great extent. Melas or festivals are organized in the month of April and October every year on the occasion of Navratra, where people from adjacent villages celebrate the festival, and meetings are held for the conservation of forests and their sustainable management. These festivals have been effective in the conservation of the area's socio-cultural heritage. Festivals of Dussehra and Ram Navami are celebrated by people around Ulkagari region, which is also a traditional practice to create awareness regarding conservation programmes. A two day fair in the month of December is celebrated as Anusuya Mela, during which Rath Doli from nearby Ghram Sabhas is taken from village temples to the Anusuya Devi temple. Taking the principal guardian deity out of the temple in a decorated doli is practiced in all these temples. People across Garhwal come there to celebrate the special prayers and worship is offered at the Anusuya Devi temple.

A large fair is held in the month of December on the occasion of Duttatreya Jayanti. Thousands of pilgrims come here to worship the Goddess throughout the night with lamps ablaze in their hands.

TABOOS, RITUALS & RESTRICTIONS

The taboos and rituals associated with these sacred natural landscapes has been one of the motivating factors for a sustainable use of resources. The water source in the Jameshwar forest is

from Trijuginarayan and, as previously mentioned, all the goddesses and gods from places like Kedarnath and Badrinath come to this place to have a bath. No spitting and construction of toilets is allowed nearby the Ansuiya temple. Normally, worshipers visiting these temples stop eating onion, garlic, and egg before a week. People also sometimes leave their footwear way behind in the fringes and visit the temple with bare feet to make their wishes come true. In certain cases, people get their heads shaved to make ceremonial offerings to the god. Earlier, people used to remove leathery items before entering these sacred landscapes. The killing of animals resembling Hindu gods and goddesses is prohibited. In some landscapes, even the extraction of biomass is prohibited from one week to many years. The use of iron weapons like axes is prohibited for the felling of trees. Species like Cedrus deodara, Prunus cerasoides and Celtis australis are considered sacred in Hindu religion and are hence protected and used for religious purposes only.

SACRED GEOGRAPHY

The temple complex is located atop of a hill. After a trek of a kilometre, a flight of steps leads to the first level of the temple complex. At this level the temples of Lord Shiva and Lord Laxmi Narayan are situated. On the northern side, a house for the pujari of the temple is constructed. Another flight of steps leads to the main temple of Chandrabadni. The temple is octagonal in plan with a veranda around it (figure 5). The main temple inside is very small and contains a *shri-yantra* carved out on a flat stone instead of any idol. The power emanating from Sita's torso above the main temple accounts for the great significance ascribed to this place.

PROBLEMS & PROSPECTS

The sacred landscapes are mostly administered by the Forest Department like the rest of the groves in India. However, due to the presence of local inhibiting human populations, they have raised community forests, administrated by them, and allowing people to be in contact with these landscapes as well. Green felling has been banned, and partial extraction of biomass in the form of dead wood, fallen trees and dry matter, is allowed from the forest floor around the temples. The awareness among villagers about the conservation is historical and social fencing and demarcations by red pieces of cloth in the fringe areas are substitutive conservation tools to protect these forests.

Agro-forestry and social forestry practices have been adopted by villagers, by which an intense anthropogenic pressure on forests and forest products is being reduced. The use of weapons makes deities unhappy and has been stopped partially by the local inhabitants. Van Panchyat Committees, in collaboration with forest department officials, have also set up regulations for a better management of pristine forests by the communities.

At Maroor, the forest is opened in the autumn season for collection of fodder only from Oak trees. For construction purposes, Rs. 150 must be deposited in the Panchayat for cutting down one tree of Pinus roxburghii with prior permission. Both male and female groups are involved in the decision-making processes and management issues.

Human activities such as the collection of fuelwood, fodder, timber for construction, and cattle grazing affect the ecological status of landscapes, whereas developmental activities like road construction, dam establishment and other income generating activities may force younger generation to ponder, that such landscapes were only superstitious. Present observations confirm

that traditional rituals and taboos are respected by older generations, whereas the younger generation is migrating to earn their livelihood activities. Fading traditional knowledge from older to younger generation may no longer preserve the traditional heritage of knowledge.
This site is of immense significance to local communities. However, most of the vernacular architecture has disappeared in the region. There is a need to develop a palette of local materials for repair and renovation works which are non-detrimental to the heritage character. Incremental additions within the complex should be carefully planned, with material and construction conforming to or respecting the heritage structure.

Site interpretation is essential in order to make people realise the sacred nature of their forest. Waste Management needs to be enforced and especially plastic waste from rituals needs to be regulated as the water bodies are strewn with such materials and the harmful chemicals from them leaching into soil and water.

The present study suggests that the mounting pressure of human populations on natural resources like forests in the Garhwal Himalaya can be reduced by bringing local communities together with the support of the Forest Department. More forested areas should be brought under the traditional conservation (taboo) system. These measures are extremely important to achieve sustainable conservation. The entire area is religious and both male and female deities have great influences on the lives of local communities, indirectly influencing the conservation practices. Traditional celebrations of fairs and festivals are keeping the cultural heritage of the region intact.

8.2 THREATS TO UPPER GANGA

Located amidst the Himalayan mountain range, this stretch of the river is highly sensitive and ecologically fragile. This stretch is high in biodiversity value hosting habitats for endangered species such as otters, Snow Trout and Golden Mahaseer. The human population density is low compared with the middle and the lower stretches. The following are the specific threats faced by the stretch:

- Significant structural changes have occurred in the stretch due to several hydroelectric projects in the Bhagirathi and Alaknanda basins. The physical habitat of the river is further threatened by projects under construction and propped projects in the Bhagirathi and Alaknanda basins.

- 70.7% of the Bhagirathi River and 48.0 % of the Alaknanda River are affected by inundation and diversion, which have distributed the longitudinal connectivity and water flow. As a result 28.6% and 35.2% of the Bhagirathi and the Alaknanda river channels have turned into ecological desert. A decline in the population of the Golden Mahaseer due to the Tehri Dam acting as a migration barrier has been noted upstream to the Bhagirathi River (Sharma, 2003).

- The flow region in the headwaters in vulnerable to the retreat of the Gangotri Glacier (Singh et al., 2007). The glacial melt is expected to increase summer flows for some years until the disappearance of the glacier, which would be followed by a reduction in the flow (Mall et al., 2006).

- The altered flows due to structural and climatic changes cause distribution in the life history strategies of many in- streams organisms and affect the food web (Nautiyal., 2010).

- The climate and hydrological changes have transformed the thermal gradient in the stretch of the river, leading to a shrunken distribution range of cold-water fish species such as Schicothorax sp. And upstream range extension of several fish species such as Cyprinus carpio (Sarkar et al.,2012).

8.3 CHECKLISTs OF FAUNA SIGHTED ALONG UPPER GANGA

BIRDS

Common Name	Sci. Name	Photo ID	Date	Locality
Rock bunting	*Emberiza cia* (Linnaeus, 1766)	HIT09328	04.06.19	
Chukar partridge	*Alectoris chukar* (Gray, 1830)	IMG_8458	03.06.19	Downhill from Bhojwaasa towards Chirbasa, Gangotri
Yellow billed chough / Alpine chough	*Pyrrhocora x graculus* (Linnaeus, 1766)	IMG_8572	03.06.19	Bhojwaasa, Gaumukh
Rufous-vented tit	*Periparus rubidiventris* (Blyth, 1847)	HIT09282	04.06.19	Bhojwaasa, Gaumukh
Sulphur-bellied warbler	*Phylloscopus griseolus* (Blyth, 1847)	HIT09333	04.06.19	downhill from Bhojwaasa towards Chirwaasa, Gangotri
Blue-fronted redstart	*Phoenicurus frontalis* (Vigors, 1832)	IMG_8509	03.06.19	downhill from Bhojwaasa towards Chirbasa, Gangotri
Black redstart	*Phoenicurus ochruros* (S. G. Gmelin, 1774)	IMG_8494	04.06.19	Chirbasa-Bhojwaasa
Oriental turtle-dove	*Streptopelia orientalis* (Latham, 1790)	IMG_6849	03.06.19	Chirbasa-Bhojwaasa
Rock pigeon	*Columba livia* Gmelin, 1789	IMG_8567	03.06.19	Bhojwaasa
Black hooded oriole	*Oriolus xanthornus* (Linnaeus, 1758)	N/A	04.06.19	Gangotri
White-browed wagtail	*Motacilla maderaspatensis* Gmelin, 1789	IMG_6882	03.06.18	downhill towards Gangotri
Long-tailed shrike	*Lanius schach* Linnaeus, 1758	IMG_8332	02.06.19	Bhojwaasa
Western crowned warbler	*Phylloscopus occipitalis* (Blyth, 1845)	IMG_8141	01.06.19	Chirbasa
Common Kestrel	*Falco tinnunculus*	N/A		towards Chirwaasa, Gangotri
Snow Pegion	*Columba leuconota*	N/A		Bhojwaasa, Gaumukh Bhojwaasa

BUTTERFLIES

Common Name	Sci. Name	Photo ID	Locality
Indian tortoishell	*Aglais caschmiresis* Kollar, 1844	IMG_6873	Gangotri, Chirbasa, Bhojwaasa, Gaumukh
Painted lady	*Vanessa cardui* Linnaeus, 1758	IMG_2804	Gangotri, Chirbasa, Bhojwaasa, Gaumukh
Himalayan fritillary	*Issoria issaea* (Doherty, 1886)	N/A	Bhojwaasa
Indian cabbage white	*Pieris canidia* (Linnaeus, 1768)	IMG_6801	Gangotri, Uttarkashi
Common yellow swallowtail	*Papilio machaon* Linnaeus, 1758	IMG_8670	Gangotri, Chirbasa, Bhojwaasa
White bordered copper	*Lycaena panava* (Westwood, 1852)	IMG_8681	Maneri to Uttarkashi
Pale Hedge blue	*Udara dilectus* (Moore, 1879)	IMG_8645	Maneri to Uttarkashi
Dark clouded yellow	*Colias fieldii* Ménétriés, 1855	N/A	Gangotri, Chirbasa, Bhojwaasa

MAMMALS

Common Name	Sci. Name	Photo ID	Locality
Himalayan blue sheep / Bharal	*Pseudois nayaur* (Hodgson, 1833)	IMG_8530	Towards Chirbasa from Gangotri, Bhojwaasa
Himalayan pika	*Ochotona himalayana* (Feng, 1973)	IMG_8631	towards Gomukh from Bhojwaasa
Himalayan rock agama	*Paralaudakia himalayana* (Steindacher, 1867)		Gangotri, Chirbasa, Bhojwaasa
Bumble bee (species unidentified)			towards Gaumukh
Blue-tailed forest	*Orthetrum*		Bhojwasa-Gaumukh

hawk *triangulare* (Selys, 1878)

TREE SPECIES from GAUMUKH to HARIDWAR

1) **Betula utilis**

Vernacular name: Bhojpatra, Bhuj
Common name: Himalayan Birch
Order: Fagales
Family: Betulaceae
Genus: Betula
Species: utilis
IUCN Red List: Least Concern
DISTRIBUTION
The species is common throughout the Himalaya within 2500 to 4500m elevation range.
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)
HABIT: Deciduous tree
HABITAT
The species often grows at high altitudes (subalpine forest to tree line), frequently on slopes with unstable soils or under high snow pressure. It generally occurs in groves, and forests that receive minimal precipitation supplied by snowmelt. It is also found on northern shady slopes and ravines.
NATIVE/ EXOTIC: Native
PHENOLOGY:
Flowering: June – July
Fruiting: June – July
ECOLOGICAL ROLE
It helps in river bank stabilization and prevents soil erosion.
LOAL USAGE
In the past, the outer bark was used for the inscription of religious texts. Presently it is used for roof construction, packaging purpose, and various religious ceremonies. The bark has carminative and antiseptic properties, and a paste of the resin is applied to boils. Wood is used for timber and fuel. Leaves ate used for fodder.

2) **Pinus Wallichiana**

Vernacular name: Kail, Biar
Common name: Himalayan White Pine, Blue Pine
Order: Pinales
Family: Pinaceae
Genus: Pinus
Species: Wallichiana
IUCN Red List: Least Concern
DISTRIBUTION
The species is common throughout the Himalaya up to an elevation on 3400m
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)

HABIT: Coniferous tree
HABITAT
The species is found in the Himalaya, sometimes in pure stands or in mixed forest in association with Cedrus deodara and Pinus roxbhughii. It is a light demanding species and prefers well drained porous soils.
PHENOLOGY:
Flowering: April – June
Fruiting: April – June
NATIVE / EXOTIC: Native
ECOLOGICAL ROLE
The species grows extensively on steep slopes and controls erosion.
LOCAL USAGE
The timber is highly valued and is used as joinery, house fitments, light furniture, packing cases, railway sleepers etc. The species is commercially tapped for turpentine obtained is used for various medicinal purposes. It is also planted on wasteland and is a useful intercropping species in agro forestry.

3) Cedrus deodara

Vernacular name: Devdar
Common name: Himalayan Cedar, Deodar Cedar
Order: Pinales
Family: Pinaeae
Genus: Cedrus
Species: deodara
IUCN Red List: Least Concern
DISRIBUTION
The species is found throughout the Himalaya within an elevation range of 1700 – 3000m in the western part, where the climate is less dry.
BIOGEOGRAPHIC PROVINVES
Western Himalaya (2B)
HABIT: Coniferous tree
HABITAT
It occurs on rocky precipitous slopes, and generally forms pure stands on the northern slopes. It is light demanding specie, prefers loamy soil with high organic carbon content.
NATIVE / EXOTIC: Native
PHENOLOGY:
Flowering: June – August
Fruiting: September – November
ECOLOGICAL ROLE
It is a soil binder species and controls erosion.
LOCAL USAGE
The presence of oil in the wood makes the species highly durable and resistant from termite arracks. Thus, the species is highly valued as timber.

4) Hippophae salicifolia

Vernacular name: Amesh, Chook, Ameel
Common name: Seabuckrhorn
Order: Rosales

Family: Elaeagnaceae
Genus: Hippophae
Species: salicifolia
IUCN Red List: not Listed
DISTRIBUTION
The species is distributed in the Trans- Himalaya regions of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and North East within an elevation range of 2000 – 3500m.
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)
HABIT: Small deciduous tree
HABITAT
The species grow luxuriantly on sun facing northern aspects of steep slopes in riparian buffers. It prefers sandy and eroded soil and grows well on river banks, streamlets and sometimes also in forest habitats. It often forms pure stands on freshly formed landslips and is a pioneer deciduous species.
NATIVE / EXOTIC: Native
PHENOLOGY
Flowering: June – September
Fruiting: June – September
ECOLOGICAL ROLE
It is an indicator species of riparian buffer health and helps in river bank stabilization. The species as the ability to ameliorate soil and increases soil fertility being a nitrogen fixer.
LOCAL USAGE
The tender branches and leaves produce oil that is used as an ointment for treating burns. Oil made from its fruit is used for cardiac disorders; heal burs, eczema, relation injury and stomach illness. The fruit is edible and is made into jams and jellies and health products.

5) Populous ciliate

Vernacular name: Chalun, Biaon, Ban peepal, Pahari peepal
Common name: Himalayan Poplar
Order: Malphigales
Family: Salicaceae
Genus: Populus
Species: ciliata
IUCN Red List: Least Concern
DISTRIBUTION
The species is common throughout the Himalaya up to and elevation of 3400m.
BIOGEOGRAPHIC PROVINCE
Western Himalaya (2B)
HABIT: Deciduous tree
HABITAT
It is a fast-growing species and can be seen growing on steep slopes, mountains in mixed mountain woodland or forest. It prefers moist cool places and is able to grow on a wide range of soils.
NATIVE / EXOTIC: NATIVE
PHENOLOGY
Flowering: March – April
Fruiting: March – April
ECOLOGICAL ROLE

The species help in erosion control. It is a fast growing species and grows easily from branches and stem cutting, helping in river bank stabilisation.
LOCAL USAGE
The wood is used for fuel and timber. The fibre of the species is used for making paper. Bark of the species is used for medicinal purpose. It is also planted along agricultural fields as wind break.

6) Alnus nepalensis

Vernacular name: Uttees
Common name: Indian Alder, Nepal Black Alder, Himalayan Alder
Order: Fagales
Family: Betulaceae
Genus: Alnus
Species: nepalensis
IUCN Red List: Least Concern
DISTRIBUTION
The species is found throughout the Himalaya up to an elevation of 2600m.
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)
HABIT: Semi – deciduous tree
HABITAT
The species occurs naturally in both pure and mixed stands, and is common along streams, rivers and ravines. It is a fast growing species and can tolerate flooding, shade, slope and water- loffing.
NATIVE / EXOTIC: Native
PHENOLOGY
Flowering: October – May
Fruiting: October – May
ECOLOGICAL ROLE
The species helps in erosion control on hillsides and steep slopes. The extensive lateral root system aids in soil binding in landslide areas and for river bank stabilization. Being a pioneer and fast-growing species, it helps in land reclamation.
LOCAL USAGE
Timber of the species is used for making inexpensive furniture. Wood provides charcoal and pulp for making paper. The bark is used for tanning dyeing and in local medicine.

7) Trewia nudiflora

Vernacular name: Pindalu, Pindar, Oitali
Common name: False White Oak tree
Order: Malpighiales
Family: Euphorbiaceae
Genus: Trewia
Species: nudiflora
IUCN Red List: Not Listed
DISTRIBUTION
The species is widely distributed throughout India, up to an elevation of 1000m.
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)
HABIT: Deciduous tree
HABITAT

It is a fast growing early successional tree. It is found in evergreen forests, near streams, rivers and open sites. It prefers alluvial soil and can grow on dry ground.
NATIVE /EXOTIC: Native
PHENOLOGY
Flowering: November- March
Fruiting: November- March
ECOLOGICAL ROLE
The roots of the tree are soil binder and control erosion.
LOCAL USAGE
Different parts of the plant are used for medicinal purpose. Timber is used for agricultural implements.

8) Acacia catechu

Vernacular name:	Khair
Common name:	Black cutch
Order:	Fabales
Family:	Fabaceae
Genus:	Acacia
Species:	catechu
IUCN Red List:	Not Listed

DISTRIBUTION
The species is common throughout the sub Himalayan tract and outer Himalaya within an elevation range of 90 – 1200m.
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)
HABIT: Deciduous tree
HABITAT
The species occurs naturally in tropical moist deciduous forests along river banks and water sheds.
NATIVE / EXOTIC: Native
PHENOLOGY
Flowering: July – August
Fruiting: August – December ripens in the following year by February – March.
ECOLOGICAL ROLE
It is a soil binding species and help in nitrogen fixation in the soil. The species is also used as live fence.
LOCAL USAGE
Cutch, extracted from the heartwood, is used for medicinal purpose, as a dye and preservative. Kattha, obtained from cutch, is smeared on paan as a condiment with slaked lime. The bark leaves and young shoots have antiseptic and astringent properties. Timber is used for making agricultural implements.

9) Putranjiva roxburghii

Vernacular name:	Putijia
Common name:	Putranjiva, Lucky bean tree, Wild Olive tree
Order:	Malpighiales
Family:	Putranjivaceae
Genus:	Putranjiva
Species:	roxburghii

IUCN Red List: Not Listed
DISTRIBUTION
The species is widely distributed throughout India.
BIOGEOGRAPHIC PROVINCE
Western Himalaya (2B)
HABIT: Evergreen tree
HABITAT
The species grows along river banks, evergreen forests and shady valleys.
NATIVE /EXOTIC: Native
PHENOLOGY
Flowering: March – August
Fruiting: March – August
ECOLOGICAL ROLE
The species helps in river bank stabilization and prevents erosion.
LOCAL USAGE
The exudate of the species is used to treat liver complaints, colds, fevers and rheumatism. Wood is sometimes used as timber for making tools, and turnery. Seeds are used for making rosaries ad necklaces.

10) Shorea robusta

Vernacular name: Sal, Shal
Common name: Sal
Order: Malvales
Family: Dipterocarpaceae
Genus: Shorea
Species: robusta
IUCN Red List: Least Concern
DISTRIBUTION
The species is found throughout India within an elevation range of 100 – 1500m.
BIOGEOGRAPHIC PROVINCES
Western Himalaya (2B)
HABIT: Deciduous tree
HABITAT
Sal occurs in dry deciduous and moist evergreen forests. Availability of soil moisture is an important factor determining the occurrence of the species.
NATIVE / EXOTIC: Native
PHENOLOGY
Flowering: March
Fruiting: June
ECOLOGICAL ROLE
The root mass of the species helps in soil binding and river bank stabilization. It also provides shelter to other faunal species. The leaf litter aids in nutrient cycling.
LOCAL USAGE
It is a highly valued timber species that ranks second to Teak. The wood is very durable and highly resistant to termite attack. Timber is used for house construction, furniture making and railway sleepers. The stem exudates known as Sal dammar is used in show polish. Leaves are used for making plates and bowls. Oil extract and resin are used for medicinal purpose.

Pic. 110. Himalayan Birch

Pic. 111. Cedrus Deodara

Pic. 112. Populous Ciliate

Pic. 113. Putranjiva Roxburghii

9 EPILOGUE

What makes Ganga a different river?

Ganga is a river that showers benediction, it is always accepted as a life affirming force, despite its destructive nature in certain parts, especially Bihar and West Bengal. Even in the netherworld, the river points the way to paradise. She is acknowledged as a source of creation and abundance. She brings life and washes away sins. She is truly lokanadi, the River of the World.

Pic. 114.

Performing the ritual of Samudra Manthan in Garhwal

The river is much more than a water resource. Its main benediction lies in its ability to renew itself, to be fertile on its own as in the case of indirect maternity of Kartikeya or in the case of the Vasus, bearing eight sons to the mortal King Shantanu. Its waters give life to millions, as the Mahabharata exclaims, "As amrita is to the Gods, so Ganga water is to the world of men."

Ganga not only holds great spiritual and cultural significance, but her unique, natural characteristics have made her a fascinating subject of study for many scientific inquiries. A container or vial of sacred water from Ganga, known as Gangajal, can be found faithfully stored in most Hindu homes, and this water has often been observed to remain fresh for long periods. These observations and many other healing qualities that Ganga is believed to possess are not purely faith-based beliefs but have now been supported by much scientific evidence and research.

The British recorded some of the earliest scientific findings related to the unique qualities of Ganga waters. The British physician, Dr. C.E. Nelson, observed and recorded that even the dirtiest sections of the Ganga, such as a sample taken directly from the mouth of the Hooghly, remained fresh during the long boat journey back to England. The British East India Company, a seventeenth-century company that pursued trade mainly with India and China,

also preferred using Gangajal for their three-month journey back to England, stating that the water stayed "sweet and fresh." The Maharaja of Jaipur carried Gangajal in massive silver urns for his own personal use and during travel.

In a paper written by British physician, E. Hanbury Hankin, published in the French journal Annales de Institut Pasteur in 1896, it was observed that the bacterium, which causes the deadly Cholera disease, could be killed within three hours of being treated with water from the Ganga. However, the same bacterium continued to thrive in distilled water ever after forty-eight hours. This unique factor presents itself in Gangajal, now known to be a virus, which eats and destroys disease-causing bacteria, was amongst the first modern citations of bacteriophagy. Additionally, Felix d' Herelle, a French microbiologist, in 1927 was amazed to find that no germs existed in a sample of Gangajal extracted from an area just a few feet below floating corpses that had died of dysentery and cholera, where one would typically predict to find millions of germs!

In addition, by continuously flowing and rubbing against many rocks, flora, mosses and other natural growth that exist along her upper stretches, Ganga becomes saturated with minerals and enriched with nutrients that supplement the living organisms dependent on her waters, and these minerals give the river antiseptic qualities.

Ganga's high Oxygen retention capacity, especially in the upper stretches of the river that originates from the Himalayas, is yet another reason why her waters do not putrefy even after long periods of storage. Through a comprehensive three-year (1982-1984) study, D.S. Bhargava, an environmental engineer at the Indian Institute of Technology, then University of Roorkee, found that Ganga's Oxygen retention capacity is fifteen to twenty-five times higher than any other river water in the world. Although the massive amount of organic pollutants dumped into Ganga could have easily consumed the Oxygen content of the river water, some unknown mystery factor catalyzed by unidentified microbes has been able to replenish the river's Oxygen content.

In Indian spirituality, water is one of the five fundamental elements that make up all of creation. Although water is a tangible form, it is also fluid, ever changing and dynamic. In a popular study conducted by HADO Research Institute in Japan, it was found that the crystalline structures of water respond to the positive and negative vibrations of their external environment. In this study, the structure of stagnant water drastically changed from the normal structure of water when offered with prayer, mantra, or positive emotions such as love and gratitude. Similar studies have been conducted by the organization, Ganga Ahvaahan, which tested and analyzed the crystal structures of samples of Ganga taken from different sources along the river. It was found that Ganga's crystal structures remained largely unaltered even with large stretches of damming and pollution in the upper stretches of Ganga, especially in places where devotees congregate, make offerings or chant to the river.

The water of Ganga is rich in diverse fauna. Within the waters of Ganga and her tributaries, 140 species of fish including featherbacks, barbs, walking catfish, gourami and milkfish, to name a few, have been discovered. Over ninety species of amphibians thrive in it. A study, examining the stretch of Ganga between Rishikesh and Kanpur alone, found forty species of Zooplankton, four species of Crustaceans, fifteen Mollusks, twelve species of freshwater turtles (four of which are endangered), and the Smooth-coated Otter. There are also

endangered Mugger and Gharial crocodiles living in her waters, as well as the Bull shark and the critically endangered Gangetic Shark (glyphis gangeticus), near the Bay of Bengal. These fish and other creatures help to clean the river and are a vital part of Ganga's ecosystem, yet many of these species are now facing extinction with the issues of pollution and low-flow.

Ganga and some of her tributaries are also home to the endangered Gangetic Dolphin. This dolphin was declared the National Aquatic Animal and has been included in the Ministry of Environment and Forests' Wildlife Protection Act since 1972. Sadly, one organization has estimated that only 1,200-1,800 individual dolphins exist now in the Ganga river system.

In addition to the creatures living directly in the river system, thousands of species live along the banks of Ganga and depend on her waters for life itself. In the uppermost regions of the river in the Himalayas, many species such as deer, boar, wildcats, wolves, jackals, foxes and the elusive endangered snow leopard, rely on the Ganga. As one travels downstream, endangered tigers, elephants, sloth bear, four-horned antelope (Chousingha) and the Large Indian Civet can be found, among other creatures such as the Rhesus Macaque and the Gray (or Hanuman) Langur.

In the large deltaic region of Ganga, known as the Sunderbans, a rich diversity of animals survive on her waters. Many large animals including the critically endangered Royal Bengal Tiger as well as the Barking deer, Axis deer, wild boar, mongoose, snakes such as the King Cobra and pythons, Monitor and Salvator lizards and the Olive Ridley turtle, among many others live here. The Sunderbans are also home to the largest estuarine crocodile in the world.

The entire stretch of Ganga and her tributaries is also home to thousands of birds that rely on Ganga for water and fish, with many settling in water-covered swamp areas along her banks. Over forty-eight species of birds have been identified between Rishikesh and Kanpur alone, including mynahs, kites, parrots, crows, kingfisher, partridges, fowl, ducks and snipes. The Sunderbans is a large breeding ground for a wide variety of birds, including the Spotted Billed Pelican, Cotton Teal, Herring Gull, Caspian Tern, Grey Heron, Large Egret, White Ibis, Osprey, Peregrine Falcon and a variety of owls and sea eagles, among many other varieties. Five separate areas along the Ganga, support birdlife found nowhere else in the world.

The plants that grow along the banks of the Ganga and her tributaries play an important role in the diverse ecosystems the river supports. Not only do the plants rely on the Ganga for water, but they also play an important role in nutrient and water conservation, and their presence controls soil erosion along the banks. The entire upper plains of the Gangetic Basin, including the area between the Ganga and the Yamuna rivers, used to be covered with tropical moist deciduous forest made up of Sal trees and other species. Unfortunately, most of this forest has now been depleted and the lands heavily cultivated. These thick Sal forests can still be seen further upstream, such as the area surrounding Rishikesh.

As one moves further north towards the source of Ganga at Gaumukh glacier, the ecosystem consists of Chir pine, Deodar, Fir, Spruce, Oak, Juniper and Rhododendron. In the lower plains of the Gangetic basin, Cotton trees (Bombax ceiba), White Siris (Albizia procera), Duabanga grandiflora, and Sterculia villosa exist, among many others.

The Sunderbans is the largest estuarine forest in the world, covering 9,630 kilometers (5,816 miles) and consisting of fifty-four islands divided by innumerable tributaries of Ganga. Mangrove forests and mud flats, as well as Genwa, Dhundal, Passur, Garjan, Kankra and Goran trees, as well as other species of plants cover this rich forest-swampland.

The entire stretch of Ganga is rich in flora and fauna, and her sensitive ecosystem must be protected. Hundreds of millions of humans and even more plants and animals depend on her waters for life. A pristine and free-flowing Ganga must be restored for the health of India.

Ganga truly is unique from other bodies of water. With deep scientific implications for humanity, there is still much to learn about the Ganga. It is a tragedy that today Ganga's distinctive nature is quickly deteriorating. In many stretches along her shores, the pollutant load is so high that any interaction with the contaminated water causes skin and waterborne diseases. Thus, new and innovative research has an important role to play in the restoration, protection and maintenance of the uniqueness of Ganga.

Ganga has shaped the Indian concept of cyclical time as against a linear sense of time and in our culture, she is the Vaitarini, the eternal river that every soul must cross. However, for the present, it would be more relevant to understand the concept of the river in terms of pralaya or apocalypse in the cosmic cycle. Water has this immense capacity to render fertile, but it is also the universal solvent, the one that dissolves every life form. Let us beware of this destructive force before Shiva's matted hair loosens up and wreak havoc on humanity.

Pic. 115

Hoping for a secure future on the banks of the Ganga

अस्या जलस्य गुणा : शीतत्वम्, स्वादुत्वम, स्वछत्वम, अत्यन्तरुच्यत्वम्, पथ्तत्वम्,
पावनत्वम्, पापहारित्वम्, तृष्णामोहध्वंसत्वम्, दीपनत्वम्, प्रज्ञाधारित्वंच, इति राजनिर्घण्टः

The qualities of Ganga water are: Coolness, Sweetness, Transparency, High Tonic properties, wholesomeness, potability, ability to remove evils, ability to resucitate from swoon caused by dehydration, digestive property and ability to retail; wisdom.

10.0 NATURAL HERITAGE IN THE HARIDWAR STRETCH

As Ganga River enters into foothills and plains the natural zone characteristics differ from upstream hill districts. Accordingly, this section elaborates the natural heritage of the Haridwar Distt.

CONTENTS

LIST OF MAPS

1.0 Introduction

Haridwar Distt. is located between 29.58ºN latitude and 78.13ºE longitude covering an area of 2360 sq.km. in the western part of Uttarakhand state. The Distt. is bordered by Saharanpur in the west, Dehradun in the north and east, Pauri Garhwal in the east, Muzzaffarnagar and Bijnor Districts in the south. The Distt. headquarter is situated at Roshnabad and the Distt. is divided into 3 tehsils – Haridwar, Roorkee and Laksar. **The 56-km-long stretch of River Ganga drains the eastern part of the Distt.**. Haridwar city (termed as "Gateway to Gods") is one of the holiest places in India and a most significant cultural hotspot on River Ganga. Owing to its immense religious importance, this city also hosts different festivals such as Kaavad Mela, Ganga Dusshera, and others throughout the year along with being an important venue for the mammoth Kumbh Mela which takes place once in every twelve years.

Pic.116 : Majestic Sweep of Ganga near Harki Pauri, Haridwar

2.0 Ganga River In Haridwar

Originating from Gangotri glacier, River Ganga flows through the Himalayan valleys for about 253 kms before entering the plains. Ganga River enters Haridwar from northern end of the Distt. and flows through steep hills of Shiwalik range covered with dense forest including Rajaji National Park, Chandi reserve forest and Sabalgarh reserve forest [Ref. Map 11].

Near Har ki Pauri, the 19th century built Bhimgoda barrage [commissioned 1854] hinders the natural flow of the river, diverting much of its water into the Upper Ganga Canal and the East Ganga Canal. After crossing the Bhimgoda barrage, the river divides into several braided channels [Ref. Map 12] which occupy a width of about 3.5 km. Further ahead, the river flows southwards draining the eastern part of the Distt. The Banganga stream, a distributary channel of Ganga, emerges from the main river Ganga near Shahpur Sheetlakherais and forms the only west flowing river channel in the entire course of the river. In the southwestern part, the river inundates several flood plain lakes and tanks including the wetland near Shivpuri village [Ref. Sec.7.2].

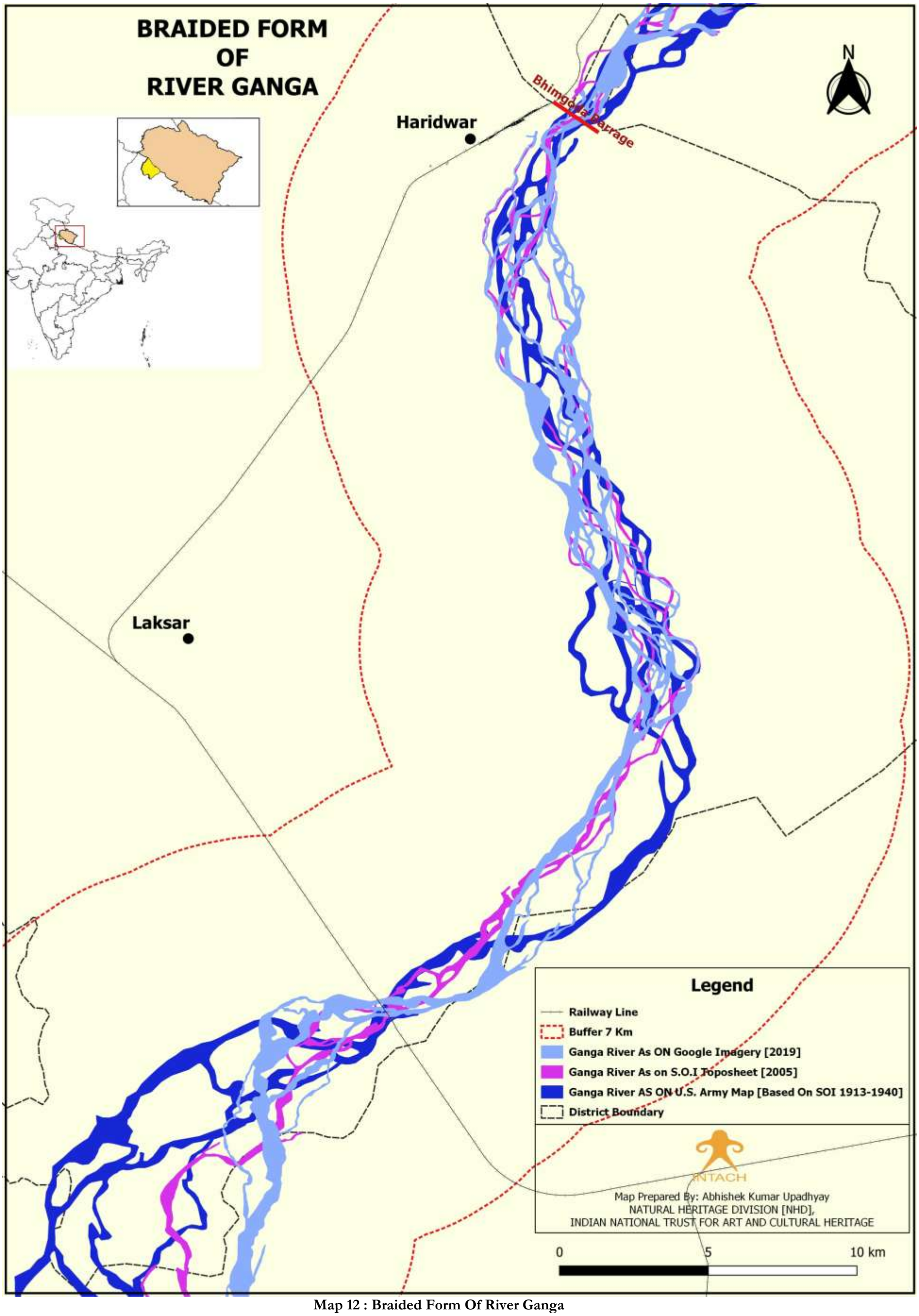
The discharge in Ganga River increases markedly in its downward course as it receives inflows from different tributaries and also shows a marked seasonal variation in its volumetric flow. During summer months [April to June], the melting snow feeds the river, while in monsoon months the flow intensity increases sometimes leading to flood conditions. In the winter season the river's flow declines significantly and its spread shrinks considerably.

Physiographically, the Distt., from north to south, can be divided into three units – the structural hills [Shiwalik], the *bhabar* and the *tarai* area.

- The structural hills, also called Shiwaliks, have high runoff due to the rugged topographic and homogenous lithologic conditions.

- The *bhabhar* belt, lying just below the Shiwaliks, has varied drainage system along its foot and is characterized by boulders, cobblestones, pebbles, sand and clay formations. This unit covers the area between Harki Pauri to Bhogpur reserve forest.

- The *tarai* plain can be divide into older and younger alluvial plains. These plains have characteristics of textured course to fine grained sand, gravels and clay.



Map 12 : Braided Form Of River Ganga

3.0 Tributaries Of River Ganga [Within 5-7 Km Buffer Zone]

Soil and Land Use Survey of India [SLUSI] has classified the water resource system of the country in six parts and kept right bank of river Ganga and its tributaries in Haridwar Distt. into water resource region 2 [basin - 2B and catchment - 2B6]. The eastern part of Haridwar Distt. along with river Ganga and its tributaries are kept under sub-catchment - 2B6D and Watershed - 2B6D5 [Banganga River drainage], 2B6D6 [Kotawali River drainage] and 2B6D7 [Rawasan River drainage]. Major tributaries of River Ganga flowing in from left and right banks are shown in Table below:

Table 01 : Major Tributaries [North to South]

S. No.	Left Bank Tributaries	S. No.	Right Bank Tributaries
01	Ghansi Ram Ka Sot	01	Ranipur Rao
02	Bhai Khan Sot	02	Begam Nadi
03	Chandi Sot	03	Banganga River
04	Sidh Sot	04	Pathri Rao
05	Pili Nadi		
06	Rawasan Rao		
07	Kotawali Rao		

3.1 Left Bank Tributaries

Tributaries flowing from eastern side of River Ganga are located within the watershed 2B6D6 and 2B6D7.

- Ghansi Ram ka Sot flows parallel to the northern and southern boundary of Pauri Garhwal of Chilla reserve forest and Haridwar Distt. [Ref. Map 11, Pic 117].

- Stream Khara Nadi originates from Chiraunda Pakha and meets Ghansi Ram Ka Sot [south to the Kodimali Pahara]. Another stream named Lastarwala Sot empties into Ghansi Ram Ka Sot, one km before the Chilla dam-Rishikesh road.

- Khara sot, Bhai Khan Sot, Chandi Sot [Ref. Pic 118] and Sidh Sot [Ref. Pic. 119] are small and seasonal tributaries emerge from dense jungle. These rivers are jeepable in dry season.

Other prominent rivers on the left bank of Ganga is Pili Nadi, Rawasan Rao and Kotwali Rao.

- Tributaries of Pili Nadi i.e. Mithai Wali Rao, Nani Sot and Luni Sot originates from Udaipur Palla in the eastern part of Chandi reserve forest. River Pili meets Ganga three km south to a settlement called Shyampur.

- Rawasan Rao originates near Kher-Pokhri Danda at a height of 1,130 amsl. It is bounded by latitude 29°55'33.82"N and longitude 78°26'42.41"E [Ref. Map 11, 13 & Pic. 121, 122]

- Saterh nadi [emerges near Hanali village], Jarpani Sot [emerges near Pudiyan reserve forest] Thal Nadi, Hinauva Sot, Dao Sot and Kurapani Sot are the major tributaries of the Rawasan Rao.

- Kukarpani Sot and Bandarpani Sot are important sub-tributary of Rawasan meets Jarpani Sot before Pudiyana reserve forest. Below the junction of Saterh and Jarpani, the river Rawasan flows parallel to Pili nadi and reaches Bhabar track near Lal Dhang and meets Ganga at Tantwala.

Pic. Pic. 117 : River Bed Of Ghansi Ram Ka Sot

Pic. 118 : Chandi Sot At Ganga River Confluence

Pic 119 : Sidh Sot At Ganga River Confluence

Pic. 120 : Near Dry Bed Of Pili Nadi Just Upstream Of Confluence With Ganga [Sep/2019]

Pic. 121 : Rawasan Rao Near NH-74

Pic. 122 : Rawasan Rao Before Meeting River Ganga [Sep/2019]

3.2Right Bank Tributaries

3.2.1 Banganga River [a distributary channel which rejoins the river further downstream]

- It emerges from river Ganga near village Tanda Bhagmal and Shahpur Sheetlakhera at latitude 29°49'22.76"N and longitude 78° 9'33.15"E. [Ref. Map 11, 13 &Pic. 123, 124]

- A small stream originates from Ganga near village Bishanpur [29°51'38.98"N, 78° 8'39.10"E] and meets Banganga near village Ramkundi.

- Banganga Passes through Bhogpur, Sultanpur Patti and Raisi, before meeting with Ganga in Muzaffarnagar Distt. the river forms large swampy area at the junction and provides habitat to swamp deer (*Rucervus duvaucelii duvaucelii*) [Paul et. Al; 2018].

3.2.2 Begam Nadi

- A tributary of river Ganga named Begam Nadi emerges near village Jiyapota and Misarpur at latitude 29°52'37.18"N and longitude 78° 8'36.94"E. The river flows through Katarpur, Chandpur, Padartha, Pathari Reserve Forest, Phulgarh, Fadaipur and Munda Khera and meets Pathari Rao near Akaudha Mukramatpur [29°42'18.14" N, 78° 4'3.25" E]. [ref. Map 11, 13]

3.2.3 Pathri Rao and Rani Pur Rao

- Pathri Rao originates from Pathri Reserve Forest; a channel named Pathrwa Rao meets Pathri Rao and goes up to River Rani Pur Rao.

- River Rani Pur Rao originates from the foothills of Shiwaliks near BHEL at latitude 29°56'51.18"N and longitude 78° 5'3.91"E [Ref. Map11].

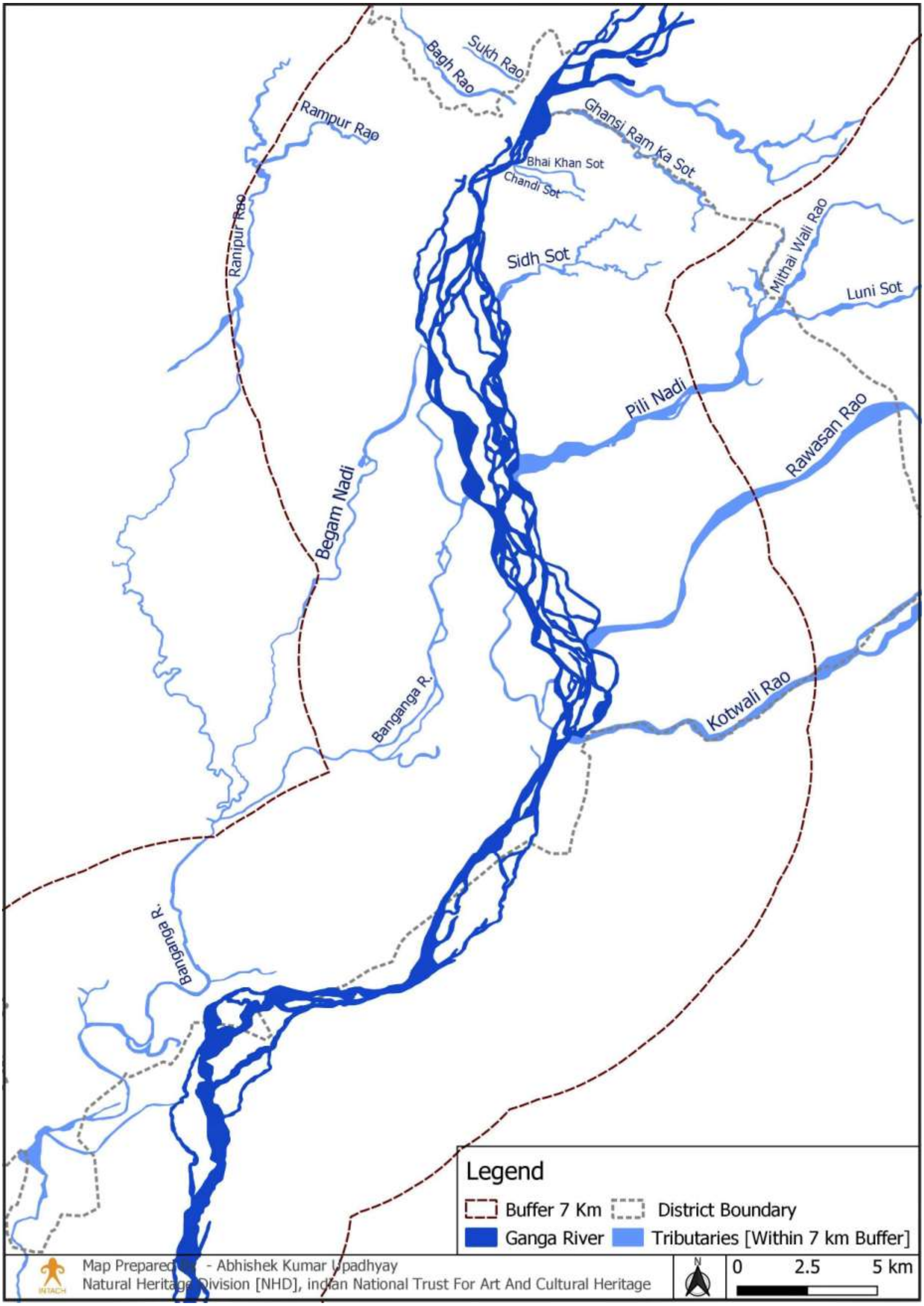
- Rampur Rao and Rawali Rao, two major tributaries of Rani Pur Rao, originate in the dense forest of Haridwar forest range and Rawali forest range of Rajaji National Park. The scenic beauty of the area around Rampur Rao including Sureshwari Temple attracts tourists in the region.

Pic. 123 : Banganga River Near Village Netwala Saidabad [29°41'42.51"N, 78° 3'33.97"E]

Pic. 124 : Banganga River Near Panchleshwar Temple [Sep/2019]

Pic 125 : Rani Pur Rao After BHEL [Sep/2019]

Pic. 126 : Rampur Rao [Sep/2019]



Map 13 : Tributaries Of River Ganga In Haridwar

4.0 Land Use And Land Cover [LULC]

Land Use and Land Cover [LULC] Map within 7 Km buffer area of the River Ganga has been prepared from satellite image [Landsat].

- Using supervised classification system, 8 classes were generated as Dense Forest (6.21%), Open Forest (13.94%), Scrub Forest (11.70%), Agriculture (27.22%), Fallow Land (11.44%), Open Land/Barren Land (20.70%), Water (4.42%) and Built-up Land (4.37%) [Ref. Map 14].

- Land Use and Land Coverof theright bank of Ganga river comprised of dense forest and open forestwhile in the left bank agricultural land, open land and built-up land are the major LULC classes.

According to Distt. statistical handbook of Haridwar [2016-2017], agricultural land [49%], forest land [31%], barren land [4%], usar land [1%] and land for other uses [13%] are major land use and land cover [LULC] components of the Distt.

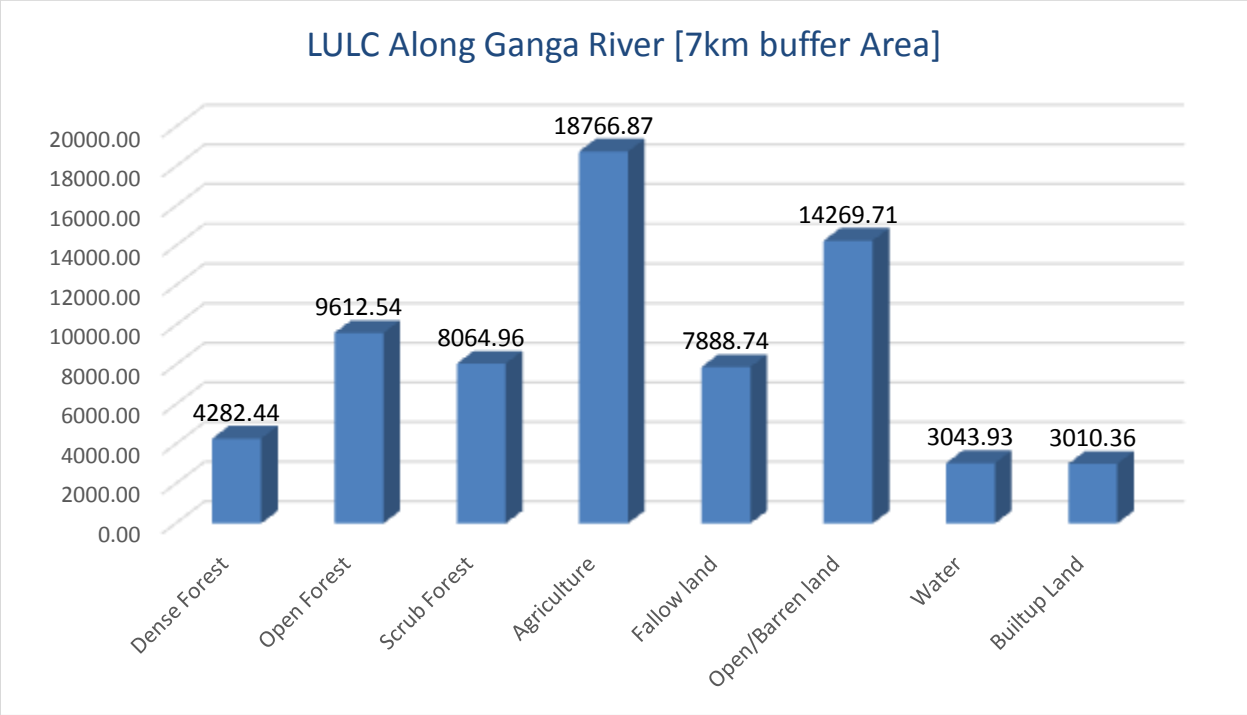
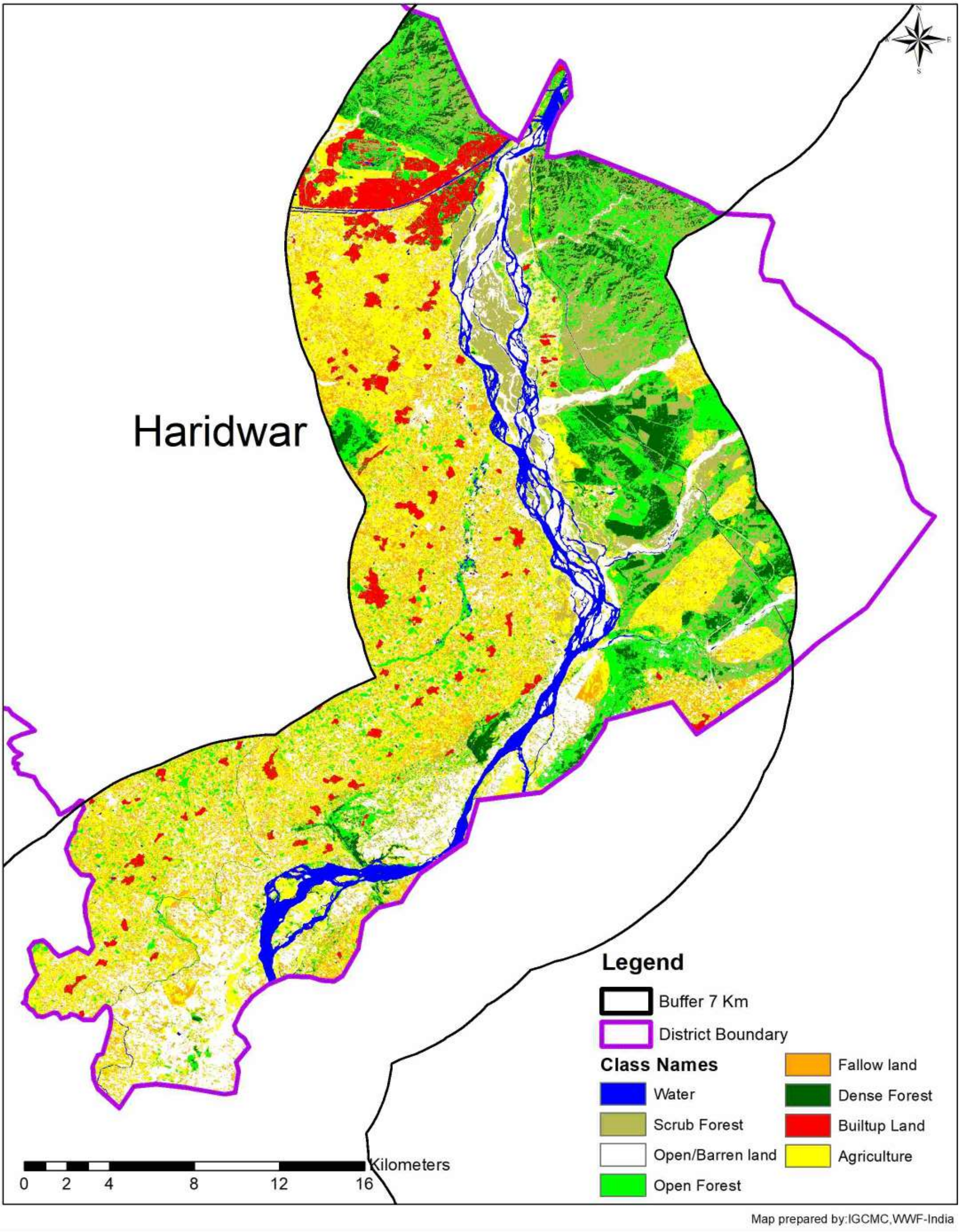


Fig. 1 : Land Use and Land Cover [LULC] Along Ganga River



Map 14 : Land Use And Land Cover [LUCL] Map In Study Corridor

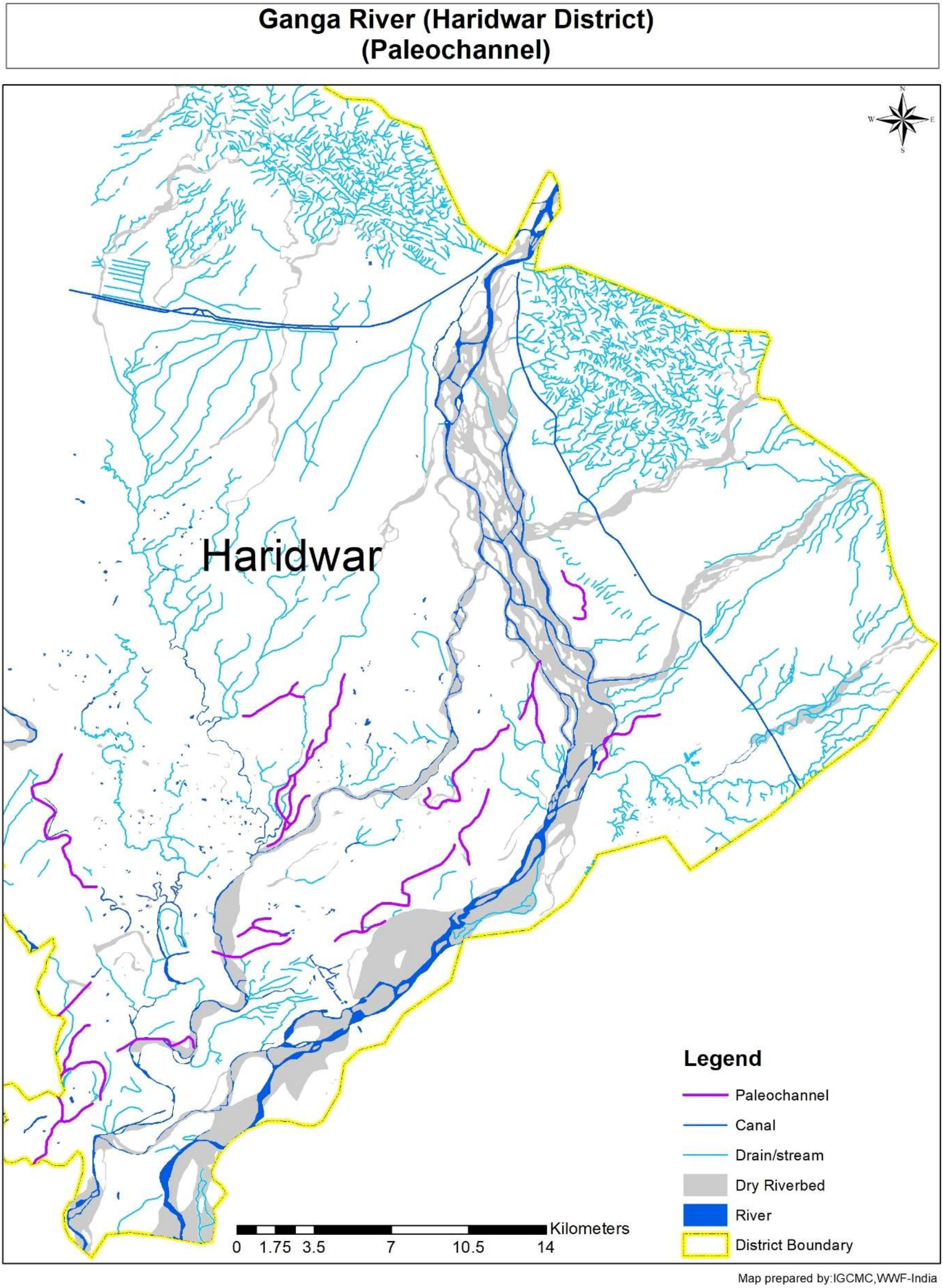
5.0 Paleo – Channels of Ganga and its Tributaries

The deposition of unconsolidated or semi-consolidated sediments in the active river channel reduces the flow of the channel and makes it inactive. The inactive channel becomes the paleo-channel which gets flooded during peak flows. The rate of formation of paleo-channel on right bank of Ganga is very high due to flat terrain and high sediment carrying capacity of the tributaries.

The drainage system of Haridwar Distt. depicted in U.S. Army Map [based on SOI Toposheets (1913-1940)] were analyzed and compared with Survey of India Toposheets (SOI, 2005) [Ref. Map 15 & 16]. It is observed that several tributaries of Begam Nadi, Banganga river and Pathri Rao have disappeared [Ref. Map 15]. LULC of these areas has shifted from lotic system to farming and mining activities.

Between year 2005 (SOI Toposheets) and 2019 (Google Earth Imagery, April 2019) the channel of Pathri Rao has almost disappeared which may be due to encroachment by agricultural fields. The river bed of Begam Nadi was found to be dry from originating point to Padartha [Dhanpura] in SOI [2005] while the dried bed of the river extended all the way downstream in year 2019. This may be due to disturbed origin point [Ref.Pic.179], illegal river bed mining [Ref sec.17], industrial activities [Ref. Map 15]and advancement of agricultural fields into river channel.

Map 15 : Satellite Image Showing Dry Bed Of Begam Nadi In Dhanpur [Padartha]



Map 16 : Paleo-Channels in Haridwar [Within 15 km buffer]

6.0 The Ganga Floodplain

The floodplains are formed naturally over a time scale of hundreds to thousands of years (Sinha et al., 1996; Soni et al. 2014). Hence, maintaining the active flood plain of a river is critical for maintaining good river health and assuring equilibrium in the ecosystem. Furthermore, the preservation of active river floodplain is also beneficial in reducing the risk to life and property during the flooding season.

The River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016 (GoI, 2016) defines flood pain of River Ganga as "such area of River Ganga or its tributaries which comes under water on either side of it due to floods corresponding to its greatest flow or with a flood of frequency once in hundred years".

The floodplains support ecological diversity in a river system by (a) providing carbon and nutrients supply to river channel, which finally governs productivity of the entire river system (b) providing geomorphic (habitat) diversity in river space to support biodiversity and more importantly (c) provides connectivity between aquatic and terrestrial environments.
- ***[Richards, et al., 2002; Gurnell and Petts, 2002; Thoms, 2003]***

Topography determines the extent of the floodplain and in view of topographic variations the floodplain width in Haridwar Distt. is highly variable, narrow in the north and broadening out in the *tarai* zone. The river channel is itself highly braided exhibiting a great degree of lateral movement making it difficult to define the floodplain sharply.

Pic. 127 : View From Hilltop Showing Active Floodplain Of Ganga In Haridwar City

6.1 Floodplain Agriculture

The nutrient deposition by floods, wetting of floodplain soil, decomposition of organic matter, high activity of microorganisms, are some of the main factors that contribute in making this area a fertile zone for agriculture activities. In Haridwar Distt., many local communities thrive on the produce from agricultural fields located in the active floodplain of Ganga River. The survey and interactions related to floodplain agricultural produce in different villages such as Jagdishpur, Ranjeetpur, Katarpur-Alipur and Bishanpur, revealed that sugarcane was the dominant crop in the Ganga floodplain of Haridwar Distt.. This was followed by rice, wheat, maize, peanuts and mustard in some places along with vegetables such as pumpkins, bottle gourd and brinjal. The major floodplain produce as recorded in some major villages is provided in Table 02 below.

Table 02 : Floodplain Produce

SR. NO.	VILLAGE NAME	FLOODPLAIN PRODUCE
1.	Jagdishpur village	Sugarcane, Rice, Wheat
2.	Katarpur Alipur village	Sugarcane, Rice, Wheat, Pumpkin
3.	Bisanpur village	Sugarcane, Rice, Wheat, Mustard, Peanuts, Urad
4.	Tatwala Dudhita village	Sugarcane, Rice, Wheat, Makkai
5.	Dumanpuri village	Sugarcane, rice, Mustard, Urad

Pic. 128 : Paddy And Sugarcane Grown In Ganga Floodplain In Dumanpuri Village

Pic. 129 : Vegetable Farm And Eucalyptus Plantation Near Ramkundi Village

Pic. 130 : Sugarcane Grown Near River Ganga, Bisanpur Village

6.2 Floodplain Grass

The most widespread grass in the floodplain across Haridwar Distt. is *Saccharum spontaneum* L. Commonly known as 'Kans' in Hindi and 'Wild Cane' in English, this species is a tall and perennial grass naturally growing in the alluvial plains, swamps and riparian areas of north India. Owing to its deep roots and rhizomes this grass successfully and rapidly colonizes the floodplain spreading in vast areas with its height reaching 3-4 m in some places.

In almost all the villages during our survey, the local people were found to be using this grass for as roof thatch of their houses. Though none of the respondents in our survey revealed any medicinal use or application of this grass, this species is one of the important medicinal plants in traditional systems of medicine in India according to Ayurveda (Pandey et al., 2015).

Pic. 131 : Luxuriant Growth Of *Saccharum Spontaneum* in Floodplain near Jagjitpur village

Pic. 132 : *Saccharum Spontaneum* Grass Used By The Locals For Roof Thatching

7.0 Flood Plain Lakes

India has extensive floodplain wetlands, defined as low lying areas bordering large rivers, which are seasonally inundated by the overspill from main river channel (Dutta et al., 2019). These can be lakes, sloughs, meander scroll depressions, back swamps, residual channels or tectonic depressions. The floodplain wetlands are biologically sensitive habitats and play a vital role in supporting rich biodiversity along with providing several ecosystem services.
During survey in Haridwar Distt., two major floodplain lakes were recorded which are important for flora and fauna in the region. **However, while one of these is protected as an important conservation reserve [Jhilmil], the other one has not been recognized yet despite large size and importance to the regional wildlife.**

7.1 Jhilmil Jheel Conservation Reserve

The Jhilmil Jeel or Jhilmil Taal [Ref. Map 17&Pic. 133] is a saucer shaped wetland lying in the Chiriyapur range of Haridwar Forest Division. It is located between Haridwar–Najimabad highway and the River Ganga spreading over an area of 3783.50 hectares with an elevation ranging from 200-250 m above MSL (Anonymous, 2005). **This is literally the last piece of primordial Terai marshland to remain protected and undisturbed in Uttarakhand.**

The landscape of this area is a mosaic of short and tall grasslands, tropical mixed deciduous forests, secondary scrubs and plantations. Throughout the landscape, shifting of river channels over time has left behind many old channels where numerous seasonal and perennial swamps (‘*tals*’) or wetlands occur (Tewari & Rawat, 2013a). This area was declared a ‘Conservation Reserve’ as per norms of Wildlife (Protection) Amendment Act, 2002.

The conservation reserve acts as buffer zone as well as connecting corridor for important wildlife in the surrounding Rajaji National Park. The Jhilmil Taal receives water from the perennial streams originating from the Shiwaliks of Chidiyapur Forest Range [Ref. Map 17& 18] as well as from the flood spill of River Ganga.

7.1.1 Floristic Diversity

This area is rich in floristic diversity with *Typha* sp. being the dominant grass in the wetland. Along with this, the grasses of family Cyperaceae – *Cyperus flavidus*, *C. esculentus* and *Kyllingia nemoralis* were growing luxuriantly near the perennial streams draining water in the taal. The major trees in the region included *Dalbergia sisoo*, *Acacia catechu*, *Pongamia pinnata*, *Bombax ceiba*, *Azadirachta indica* and *Trewia nudiflora* along with the palm tree species – *Phoenix Sylvestris,* which had a good regeneration in the area.

- **Monoculture plantations of eucalyptus and teak trees were also found to be present in some areas surrounding the wetland.**

- **Among the shrubs, *Lanatana camara* and *Ziziphus* sp. were found to be luxuriantly growing in the reserve. Some of the dominant grasses of Jhilmil Taal are shown in pics. 135-138.**

Pic. 133 : Jhilmil Jheel wetland

7.1.2 Inflow And Outflow

The rich floristic diversity coupled with suitable environmental conditions and availability of water makes this area an important habitat for numerous faunal groups. The reserve gets water from two perennial streams coming from the hilly areas of the reserve forest. The outflow of the conservation reserve goes directly to the River Ganga [Pic. 134].

Pic. 134 : Outflow of Jhilmil Jheel

Pic. 135 : *Cyperus esculentus*

Pic. 136 : *Cyperus flavidus*

Pic. 137 : *Chrysopogon aciculatus*

Pic. 138 : *Kyllingia nemoralis*

7.1.3 Faunal Diversity

The most significant animal species inhabiting this terai landscape is the **Swamp Deer or 'Barasingha'** (*Rucervus duvaucelii*). This deer is considered to be in 'Vulnerable' category in the IUCN Red List with its population trend to be decreasing. With a global population of less than 5000 individuals, this species has a very limited distribution spanning over 2000 sq.km. in India and Nepal (Tewari & Rawat, 2013a).

Owing to the legal conservation status coupled with efforts of the local department, Jhilmil Jheel is today home to about 250 swamp deer. Despite the large-scale fragmentation and burgeoning anthropogenic pressures in adjoining regions, this reserve is a good example of swamp deer conservation.

Besides the swamp deer, this reserve is also home to a large population of **Hog Deer** (*Axis porcinus*) which is also listed in the IUCN Red List as 'Endangered' species with declining population trends. Another important deer species in this reserve is of ***Chital*** (*Axis axis*) which are also present in good numbers.

With respect to the carnivorous species in this reserve, the Leopard (*Panthera pardus*) is known to inhabit this region which is also listed as 'Vulnerable' in the IUCN Red List. Besides, the flagship species – Tiger is also spotted occasionally in this conservation reserve. The Jhilmil Taal is also an important habitat for the marsh crocodile or '**Mugger**' (*Crocodylus palustris*) which is also an IUCN Red Listed faunal species. In a study conducted by Tewari & Rawat (2013b), this conservation reserve was also found to be harboring rich butterfly diversity of 134 species which can be directly linked to the rich assemblage of floral species in the region.

According to the forest department, more than 30 species of resident and migratory birds are also found in this region including the popular **Sarus Crane** (*Antigone antigone*) which is listed as 'Vulnerable' species in the IUCN Red List. Other threatened avian species recorded from this wetland include **Egyptian vulture, Lesser adjutant stork, Black bellied tern and Black necked stork** (IIITs, 2012).

Pic. 139 : A Herd Of Chital In Jhilmil Jheel Conservation Reserve

Map 17 : Jhilmil Jheel Conservation Reserve

7.2 The Wetland Near Shivpuri Village

During field work, an elongated marshy wetland of size about 180 ha. was found to be present near Shivpuri Village in Haridwar Distt. [right bank of Ganga] [Ref. Map 11]. Upon inquiring with the locals in the region, it was found that this wetland had a rich biodiversity but no name was attributed to it yet. Within this wetland is a temple, known as Siddh Baba Temple, which is revered by the people from Shivpuri and nearby villages.

The wetland receives surface runoff from higher ground to its west and is fairly level with the Ganga River and thus receives flood spillover as well. In the lean season there is bound to be an addition to the base flow to the River from the wetland.

The temple priest claimed to be from the lineage of Guru Amra who was the spiritual guru of Alha and Udal. As per his version, Guru Amra used to practice penance in this marshy wetland about 300 years ago. After him, other Gurus continued the penance in this wetland which eventually led to the setting up of this temple about 100 years ago. Owing to the sanctity associated with this area, the locals also consider this marshy wetland to be sacred and refrain from causing any destruction or harm to the biodiversity present here.

The wetland is mostly dominated with *Typha* grass along with *Cyperus esculentus* and *Polygonum* sp. Even here, the locals used *Typha* sp. (Patera grass) for thatching the roofs of their houses. The other common plants around the wetland included *Cannabis* sp., *Cucumis* sp., *Lanatana camara*, *Parthenium hysterophorus* and *Xanthium strumarium*. This wetland is also an important habitat for the 'Muggers' (Indian Marsh Crocodile) which are often seen by villagers, especially in evenings. People also claim to have observed Barasinghas and other deer species in this area which claim was also supported by the Forest Department officials. Despite frequent wildlife sightings, people did not show any negative attitude towards the animals in this region. This wetland is also a nesting place for many birds such as cormorants, ibis, egrets, herons and storks.

Pic. 140 : The Grass-Covered Marshy Wetland Ganga Floodplain Near Shivpuri Village

8.0 Riparian Flora In Haridwar Distt.

The riparian zone represents a transition between the terrestrial and aquatic ecosystems and is influenced by both longitudinal gradients of variation like climate and elevation as well transverse gradients like flooding, groundwater availability and substrate texture (Bhaskar & Karthick, 2015). The vegetation or forests growing naturally in the riparian zones are referred to as the riparian vegetation or the riparian forests. The importance of riparian vegetation has been realized globally in the last couple of years owing to its crucial role in several ecosystem services such as prevention of soil erosion, minimizing floods, enhancing wildlife corridor, habitat for flora and fauna.

Till recently, no systematic sampling had been undertaken for the riparian plant diversity along Ganga River. There are, however, some scattered but significant works of Pallis (1934), Auden (1941), Sahai (1953), Gupta (1960), Bhattacharyya and Goel (1982), Groffman *et al.* (1990), Krishanmurti (1991), Castelle *et al. (*1994), Shyam (2008), Gangwar and Joshi (2006) and Gangwar and Gangwar (2011) which have explored the biodiversity of Ganga river basin. Also, a detailed study published in the form of a book titled – "The Ganga – A Scientific Study" edited by Krishnamurti (1991) documents 475 riparian plant species from Rishikesh to Chinasura. The most recent detailed account of riparian flora of Ganga is available in the report of GRBMP (2012) which documents the riparian vegetation in different stretches of Ganga river and also talk about its degradation and conservation measures.

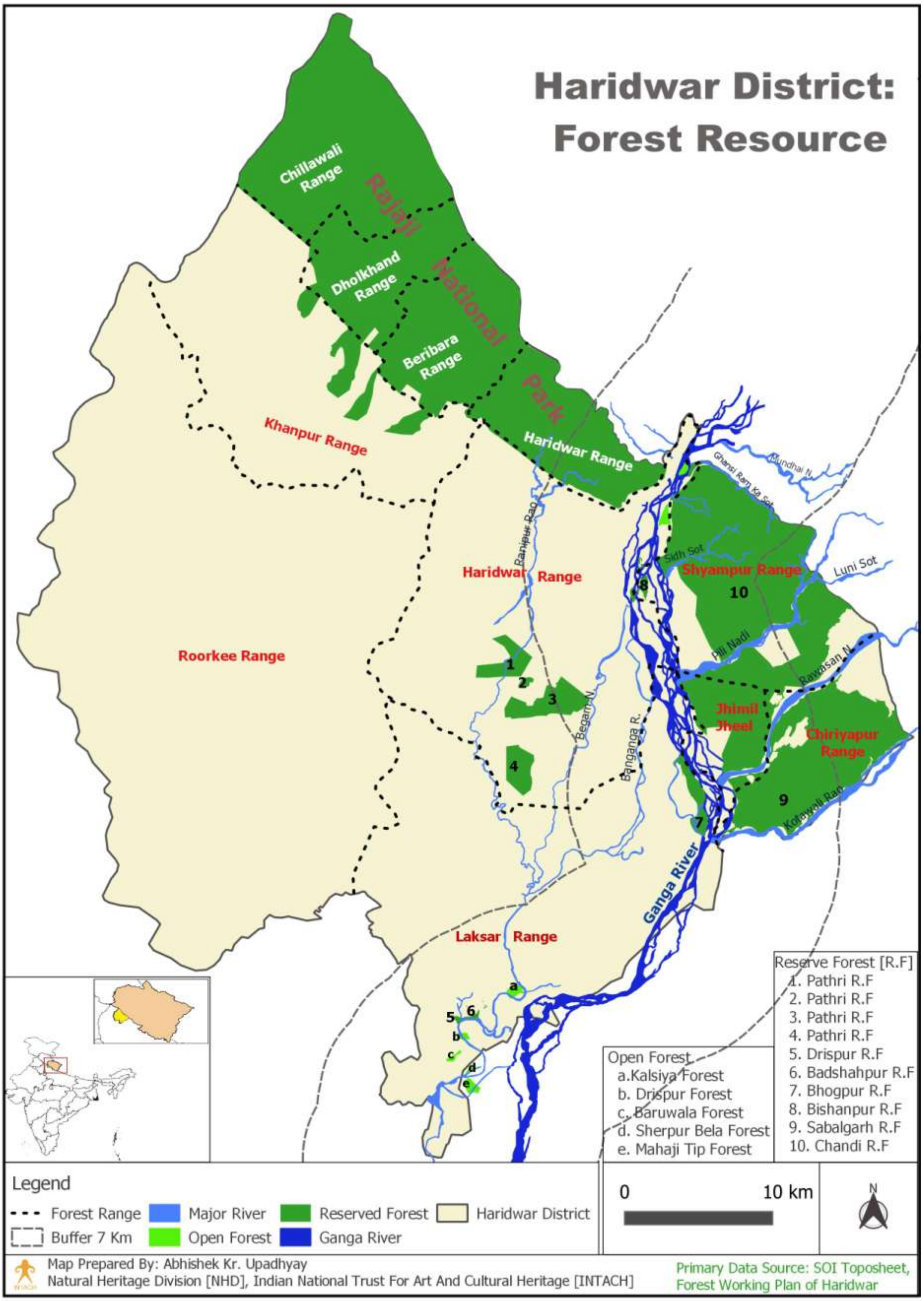
According to the Uttarakhand Forest Department, most of the riparian forests found along the Ganga River in the Distt. have not been classified or put under any specific category. Our survey in the riparian zone of Haridwar Distt. revealed the presence of about 35 angiosperm plant species belonging to 16 different families. The details of these riparian species are presented in Table 03 and some of the notable species are noted in Pic. Plate 143 to 145.

The canopy cover in the riparian forests was mainly formed by the trees such as *Bombax ceiba*, *Ficus religiosa*, *Pongamia pinnata*, *Thespesia populnea* and *Trewia nudiflora*. The palash tree (*Butea monosperma*) was found to be isolated, only growing in some places with few full developed individuals and the rest in regeneration phase.

The undergrowth in the riparian forests is mostly dominated by luxuriant growth of *Saccharum spontaneum* (Kans grass) along with widespread population of *Parthenium hysterophorus* (Congress grass). On one hand where the Kans grass comes as use value for roof thatching by the locals, the Congress grass creates nuisance for the native vegetation as well as for the locals by triggering allergies. The other widespread shrubs in the riparian zones include *Caesalpinia bonduc*, *Calotropis* spp., *Cassia occidentalis* and *Lantana camara*. Among the herbaceous plants, *Malvastrum coromandelianum* and *Tephrosia purpurea* were growing luxuriantly as compared to the other herbs in the riparian zones of Haridwar Distt..

Pic. 141 : Riparian Forest Near Bhogpur Village In Haridwar Distt.

Pic. 142 : Riparian Forest Near Tatwala (Dudhiya) Village



Map 18 : Haridwar Distt. Forest Resources

Table 03 : Riparian Plant Species Recorded In Haridwar

S. No.	Botanical name	Family	Common Name	Habit
01	*Bombax ceiba* L.	Bombacaceae	Semal	Tree
02	*Butea monosperma* (Lam.) Taub.	Fabaceae	Palash	Tree
03	*Ficus religiosa* L.	Moraceae	Peepal	Tree
04	*Ficusbenghalensis* L.	Moraceae	Banyan tree	Tree
05	*Azadirachta indica* A. Juss.	Meliaceae	Neem	Tree
06	*Pongamia pinnata* (L.) Pierre	Fabaceae	Karanj	Tree
07	*Senegalia catechu* (L. f.) P.J.H. Hurter & Mabb.	Fabaceae	Khair	Tree
08	*Tectona grandis* L.f.	Lamiaceae	Teak	Tree
09	*Thespesia populnea* (L.) Sol. ex Corrêa	Malvaceae	Paras papal	Tree
10	*Trewianudiflora* L.	Euphorbiaceae	Pindalu	Tree
11	*Calotropis gigantea* (L.) Dryand.	Apocynaceae	Safed aak	Shrub
12	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Aak	Shrub
13	*Caesalpiniabonduc* (L.) Roxb.	Fabaceae	Kantikaranj	Shrub
14	*Ipomoea carnea* Jacq.	Convolvulaceae	Besharam	Shrub
15	*Lantana camara* L.	Verbenaceae	Lantana	Shrub
16	*Mimosa himalayana* Gamble	Fabaceae	Himalayan mimosa	Shrub
17	*Senna tora* (L.) Roxb.	Fabaceae	Panwar	Shrub
18	*Solanum torvum* Sw.	Solanaceae	Turkey berry	Shrub
19	*Vitex negundo* L.	Lamiaceae	Nirgundi	Shrub

20	*Ziziphus* sp.	Rhamnaceae	Ber	Shrub
21	Cassia occidentalis L.	Fabaceae	Badi Kasondi	Herb
22	*Commelina benghalensis* L.	Commelinaceae	Kankawa	Herb
23	*Croton bonplandianus* Baill.	Euphorbiaceae	Ban Tulsi	Herb
24	*Euphorbia hirta* L.	Euphorbiaceae	Bara dudhi	Herb
25	*Leucas aspera* (Willd.) Link	Lamiaceae		Herb
26	*Malvastrum coromandelianum* (L.) Garcke	Malvaceae	Ghat Patra	Herb
27	*Parthenium hysterophorus* L.	Asteraceae	Congress grass	Herb
28	*Sesamum indicum* L.	Pedaliaceae	Til	Herb
29	*Sida cordifolia* L.	Malvaceae		Herb
30	*Solanum xanthocarpum* Schrad. & H. Wendl.	Solanaceae	Kateli	Herb
31	*Tephrosia purpurea* (L.) Pers.	Fabaceae	Purple tephrosia	Herb
32	*Tridax procumbens* (L.) L.	Asteraceae		Herb
33	*Cyanthillium cinereum* (L.) H.Rob.	Asteraceae	Sahadevi	Herb
34	*Saccharum spontaneum* L.	Poaceae	Kaans	Grass
35	*Setaria verticillata* (L.) P.Beauv.	Poaceae	Bristly foxtail	Grass

Pic. 143A : *Solanum xanthocarpum*

Pic. 143B : *Ceasalpinia bonduc*

Pic 144 : *Croton bonplandianum*

Pic 145 : *Mimosa himalayana*

9.0 Faunal Diversity In Haridwar

Uttarakhand State, with 34,651 km^2 of forest area, is one of the important states in north India with a high diversity of different faunal groups including mammals, reptiles, birds, insects, etc. The focal region in this study – Haridwar Distt. is home to a significant portion of Rajaji National Park along with Jhilmil Jheel Conservation Reserve and other reserve forest areas. Together these areas provide suitable habitat and movement corridors for different animal groups which are listed in Table 04 and discussed in this section.

- **Asian Elephant :** The Asian Elephant (*Elephas maximus*) is the largest mammal in size on earth's surface only second to its African cousin. It has been an integral part of various customs and traditions of India. The elephants occupy very large areas and are regarded as 'Umbrella species' because if they are conserved, several other species occupying niches in same area will also be conserved. They are also regarded as premier 'Flagship species' and sometimes also called 'Keystone species because of their important role in ecology and environment. The Asian elephant has been described as endangered by the Wildlife Protection Act, 1972 (Appendix-1) and by Appendix 1 of the Convention of International Trade of Endangered Species of Flora and Fauna (CITES) in 1975 (Ramachandra et al., 2012).

  The Rajaji National Park and its adjoining areas along with the other reserve forests in southern part of Haridwar Distt. are home to many elephants. According to a recent survey conducted by the Wildlife Preservation Organization of the Uttarakhand Forest Department in 2015, total population of elephants in the state was 1797. Of these Rajaji National Park in Haridwar Distt. has the second largest population of 309 individuals after the Corbett National Park. Traditionally these elephants used to move throughout these areas as well as in connecting forests of adjoining Distt.s. However, with large scale conversion of natural forests into agricultural fields along with encroachments has led to severe degradation of the natural elephant habitats in the Distt..

  During our survey, the respondents in villages such as Jagjitpur, Katarpur Alipur and Tatwala (Dudhiya) claimed to have witnessed active movement of elephants in their areas during most part of the year. According to them, none of these elephants were residing in these areas but used to come from Rajaji NP, Pathari RF, Chiriyapur RF, by crossing the Ganga River towards these villages. Mainly the elephant movement was linked to their search for food which in this case was widespread sugarcane fields in Ganga floodplain which attracted them the most. The people used to guard the fields especially during the night time to avoid destruction of produce and most of the fields had an electric fence at the boundary to prevent the elephants from entering inside.

- **Bengal Tiger :** The Bengal Tiger (*Panthera tigris*) is native to the Indian subcontinent and the national animal of India. It is accorded the highest protection under Schedule I of the Wildlife (Protection) Act of India, 1972 and is also considered to be a flagship species for conservation. It has an important role as the top predator for regulating ecological processes (Jhala et al., 2011) but despite this it has been forced to lose its ground owing to destruction of natural habitats (John Singh et al., 2010). The Rajaji National Park in Haridwar Distt. is

home to more than 15 Bengal Tigers and is also the northwestern limit of the distribution of tigers in Indian subcontinent (Rasaily, 2013).

- **Leopard :** In India, the leopards (*Panthera pardus*) occur sympatrically with tigers in most of the natural habitats (Harihar et al., 2009). Even though the leopards are not as adversely affected as the tigers by the deteriorating habitat conditions, the continuous loss of habitats coupled with unchecked poaching for illegal trade in its body parts are causing harm to the existing population of leopards in various places. The Chilla range of Rajaji National Park in Haridwar Distt. has a density of 15 leopards per 100 km^2 (Harihar et al., 2009). Besides this, the local Forest Department also claimed the presence of leopards in adjoining RF areas upto Jhilmil Jheel Conservation Reserve.

According to an article published in Down to Earth magazine in 2017, there is growing concern regarding leopards in and around Rajaji National Park turning into man-eaters. Many incidences of leopards attacking the humans had emerged in this region especially in the Motichur range of Rajaji National Park situated very close to the Haridwar city. In this range, the leopards had attacked and killed almost a dozen people especially in areas close to the National Highway. The article further links this abnormal change in leopard behavior with the 2013 floods when the bodies of people drowned in Ganga River accumulated in a barrage near Motichur and the leopards started feeding on them. The wildlife experts explained that after figuring out that the human flesh is edible, the leopards in this region started considering humans as part of their natural prey base.

Pic. 146 : Deciduous Forest Of Motichur Range - Home To The Man-Eating Leopards

- **Deer in Haridwar Distt. :** Deer are hoofed ruminant mammals comprising the family Cervidae living in a variety of biomes ranging from the tundra to tropical rainforests. India is home to many important deer species most of which feature in the threatened categories of IUCN Red List owing to drastic reduction in their natural habitats.

  In Haridwar Distt. five different species of deer are known to be present which include :
  - Swamp deer or Barasingha (*Rucervus duvaucelli*)
  - Chital (*Axis axis*),
  - Hog deer (*Axis porcinus*)
  - Sambar (*Rusa unicolor*)
  - Barking deer or the Indian Muntjac (*Muntiacus vaginalis*)

  Among these, Barasingha and Sambar are considered as 'Vulnerable' while the Hog Deer is considered as 'Endangered' by the IUCN Red List. The Rajaji National Park and the Jhilmil Jheel Conservation Reserve serve as a rich habitat for these deer owing to the formal protection and strong conservation measures by the concerned authorities.

The movement of deer from Jhilmil Jheel Conservation Reserve across Ganga River towards the marshy wetland near Shivpuri village in Haridwar Distt. was observed by local villagers. This information was further confirmed by the Assistant Conservator of Forests, Jhilmil Jheel Conservation Reserve, who said that some herds of deer used to leave the reserve, cross Ganga river and venture towards the other side mainly in search of food during the summer season. The low water levels in the River coupled with huge riverine islands served as a connecting link for deer in this region.

Pic. 147 : Chital (*Axis Axis*) In Jhilmil Jheel Conservation Reserve

❖ **Mammals of Rajaji National Park:** A detailed study on the mammalian diversity in the Haridwar, Chilla, Motichur and Gohri forests of Rajaji National Park was conducted by Joshi (2016) where he reported the presence of 44 different mammals belonging to 9 orders and 20 families. The checklist of mammals reported in this study is presented in Table 04 below.

Table 04 : Important Mammals recorded in Haridwar, Chilla, Motichur and Gohri forests of Rajaji National Park

S. No.	Scientific name	Common Name	IUCN Red List status
1.	*Hyaena hyaena*	Striped Hyaena	Near Threatened
2.	*Sus scrofa*	Wild Boar	Least Concern
3.	*Axis axis*	Chital	Least Concern
4.	*Rusa unicolor*	Sambar Deer	Vulnerable
5.	*Muntiacus muntjak*	Barking Deer	Least Concern
6.	*Naemorhedus goral*	Himalayan Goral	Near Threatened
7.	*Boselaphus tragocamelus*	Nilgai	Least Concern
8.	*Hystrix indica*	Indian Crested Porcupine	Least Concern
9.	*Melursus ursinus*	Sloth bear	Vulnerable
10.	*Ursus thibetanus*	Himalayan Black bear	Vulnerable
11.	*Viverricula indica*	Small Indian Civet	Least Concern
12.	*Paradoxurus herMaphrodites*	Common Civet	Least Concern
13.	*Paguma larvata*	Himalayan Palm Civet	Least Concern
14.	*Herpestes edwardsii*	Common mongoose	Least Concern
15.	*Herpestes javanicus auropunctatus*	Small Indian Mongoose	Least Concern
16.	*Canis aureus*	Asiatic Jackal	Least Concern
17.	*Vulpes bengalensis*	Indian Fox	Least Concern
18.	*Manis crassicaudata*	Indian Pangolin	Endangered
19.	*Macaca mulatta*	Rheus Macaque	Least Concern

20.	*Semnopithecus entellus*	Common Langur	Least Concern
21.	*Martes flavigula*	Himalayan Yellow-throated Marten	Least Concern
22.	*Lutrogale persPicillata*	Smooth-coated Otter	Vulnerable
23.	*Felis chaus*	Jungle Cat	Least Concern
24.	*Prionailurus bengalensis*	Leopard cat	Least Concern
25.	*Lepus nigricollis*	Indian Hare	Least Concern
26.	*Funambulus pennantii*	Northern Palm Squirrel	Least Concern
27.	*Petaurista petaurista*	Common Giant Flying Squirrel	Least Concern
28.	*Bandicota bengalensis*	Indian Mole Rat	Least Concern
29.	*Tetera indica*	Indian Gerbil/Antelope Rat	Least Concern
30.	*Nesokia indica*	Short-tailed Bandicoot Rat	Least Concern
31.	*Golunda ellioti*	Indian Bush Rat	Least Concern
32.	*Mus booduga*	Common Indian Field Mouse	Least Concern
33.	*Mus musculus*	House Mouse	Least Concern
34.	*Rattus rattus*	House rat	Least Concern

Source: Joshi, 2016

- **Crocodiles :** The crocodiles are large bodied semi-aquatic reptiles that are found distributed throughout the tropics in Asia, Africa, Americas and Australia. In India, crocodiles share an ancient relation with river deities and have been depicted in many scriptures, paintings and sculptures as associated with various gods and goddesses. Among these, the mugger crocodile (*Crocodylus palustris*) is the most common and widely distributed crocodile inhabiting various freshwater habitats such as rivers, lakes, reservoirs. It is listed as 'Vulnerable' species in the IUCN Red List and also features in Schedule I of Wildlife Protection Act, 1972.

  In Uttarakhand state, this crocodile species is found to inhabit the Corbett Tiger Reserve and the Banganga wetland near Laksar in Haridwar Distt. Furthermore, this species was also reported from the banks of River Ganga near Bhimgoda barrage on the edge of Rajaji National Park boundary adjoining the RF of Hardiwar division (Joshi et al., 2011). During our interaction with the locals, the mugger was also found to inhabit the marshy wetland near Shivpuri village in the Ganga floodplain.

- **Avian diversity :** During our survey [Sept. 2019], 31 different bird species were recorded. The rich diversity of birds was found in areas such as marshy wetland, riparian forests,

riverine islands and reserve forest areas. The details of these birds such as scientific name, common name and conservation status as per the IUCN Red List is presented in Table 05 below:

Table No. 05 : Rapid Survey of Bird Species in the Study Corridor

S. No.	Common Name	Scientific Name	IUCN Status
1	Spotted Dove	*Streptopelia decaocto*	LC
2	Yellow-bellied Pirinia	*Prinia flaviventris*	LC
3	Purple Moorhen	*Porphyrio porphyrio*	LC
4	Little Egret	*Egretta garzetta*	LC
5	White-throated Kingfisher	*Halcyon smyrnensis*	LC
6	Pied Kingfisher	*Ceryle rudis*	LC
7	Common Moorhen	*Gallinula chloropus*	LC
8	Little Cormorant	*Microcarbo niger*	LC
9	Common Pigeon	*Columba livia*	LC
10	Sand Martin	*Riparia riparia*	LC
11	Bronze-winged Jacana	*Metopidius indicus*	LC
12	Cattle Egret	*Bubulcus ibis*	LC
13	**Painted Stork**	***Mycteria leucocephala***	**NT**
14	Indian Peafowl	*Pavo cristatus*	LC
15	Red-vented Bulbul	*Pycnonotus cafer*	LC
16	House crow	*Corvus splendens*	LC
17	Great Egret	*Casmerodius albus*	LC
18	Ashy Pirinia	*Prinia socialis*	LC
19	Black Drongo	*Dicrurus macrocercus*	LC
20	Jacobin Cuckoo	*Clamator jacobinus*	LC
21	Black-winged Kite	*Elanus caeruleus*	LC
22	Red-naped Ibis	*Pseudibis papillosa*	LC
23	**River Lapwing**	***Vanellus duvaucelii***	**NT**

24	Green bee-eater	*Merops orientalis*	LC
25	Indian Grey Hornbill	*Ocyceros birostris*	LC
26	**Indian Spotted Eagle**	***Clanga hastata***	**VU**
27	Indian Roller	*Coracias benghalensis*	LC
28	Common Myna	*Acridotheres tristis*	LC
29	Greater Coucal	*Centropus sinensis*	LC
30	Baya Weaver	*Ploceus philippinus*	LC
31	Oriental Magpie Robin	*Copsychus saularis*	LC

Pic. 148 : Baya Weaver *(Ploceus philippinus)* Nest Sighted Near Begam Nadi

Pic 149 : Ashy Pirinia (*Prinia socialis)* sighted in Ganga Flood Plain

Pic. 150 : Baya Weaver (*Ploceus philippinus)* sighted in Ganga Flood Plain

Pic. 151 : Little Cormorant (*Microcarbo niger)* sighted in Shivpuri wetland

Pic. 152 : Pied Kingfisher (*Ceryle rudis)* sighted in Shivpuri wetland

Pic. 153 : Indian Spotted Eagle (*Clanga hastata)* sighted in agricultural field

Pic. 154 : Black Winged Kite (*Elanus caeruleus)* sighted in Shivpuri wetland

❖ **Butterflies :** Butterflies serve as important pollinators for many different plant species. In our survey, seven different butterfly species were recorded which are mentioned in Table 06 below. Some important butterflies are also depicted in Pic. 155, 156, 157 & 158.

Table No. 06 : Butterfly Species

S. No.	Common Name	Scientific Name
1	Common Mormon	*Papilio polytes*
2	Common Grass Yellow	*Eurema hecabe*
3	Plain Tiger	*Danaus chrysippus*
4	Mottled Emigrant	*Catopsilia pyranthe*
5	Peacock Pancy	*Junonia almana*
6	Small Cupid	*Chilades parrhassius*
7	Lime Blue	*Chilades lajus*

Pic. 155 : Plain Tiger *(Danaus chrysippus)* sighted near Banganga River

Pic. 156 : Common Mormon *(Papilio polytes)* sighted near Banganga River

Pic. 157 : Peacock Pancy *(Danaus chrysippus)* sighted in Bhogpur R.F

Pic. 158 : Lime Blue *(Chilades lajus)* sighted in Shivpuri Wetland

10.0 Riverine Islands Of Ganga

The river islands are typically exposed land parts surrounded by river water channels. These islands generally result from changes in the course of a river such as interactions with a tributary or the opposing fluvial actions of deposition and/or erosion such as forming a natural cut and meander. Many small and big islands in Ganga River were observed at different places such as Jagjitpur, Katarpur Alipur and Tatwala villages during our survey in Haridwar Distt..
The vegetation on these islands varied as some islands had dense vegetation with good floral diversity whilst others had less vegetation with mostly *Saccharum spontaneum* as the dominant plant. The details of all the plant species recorded on Ganga riverine islands in Haridwar Distt. is presented in Table No. 07.

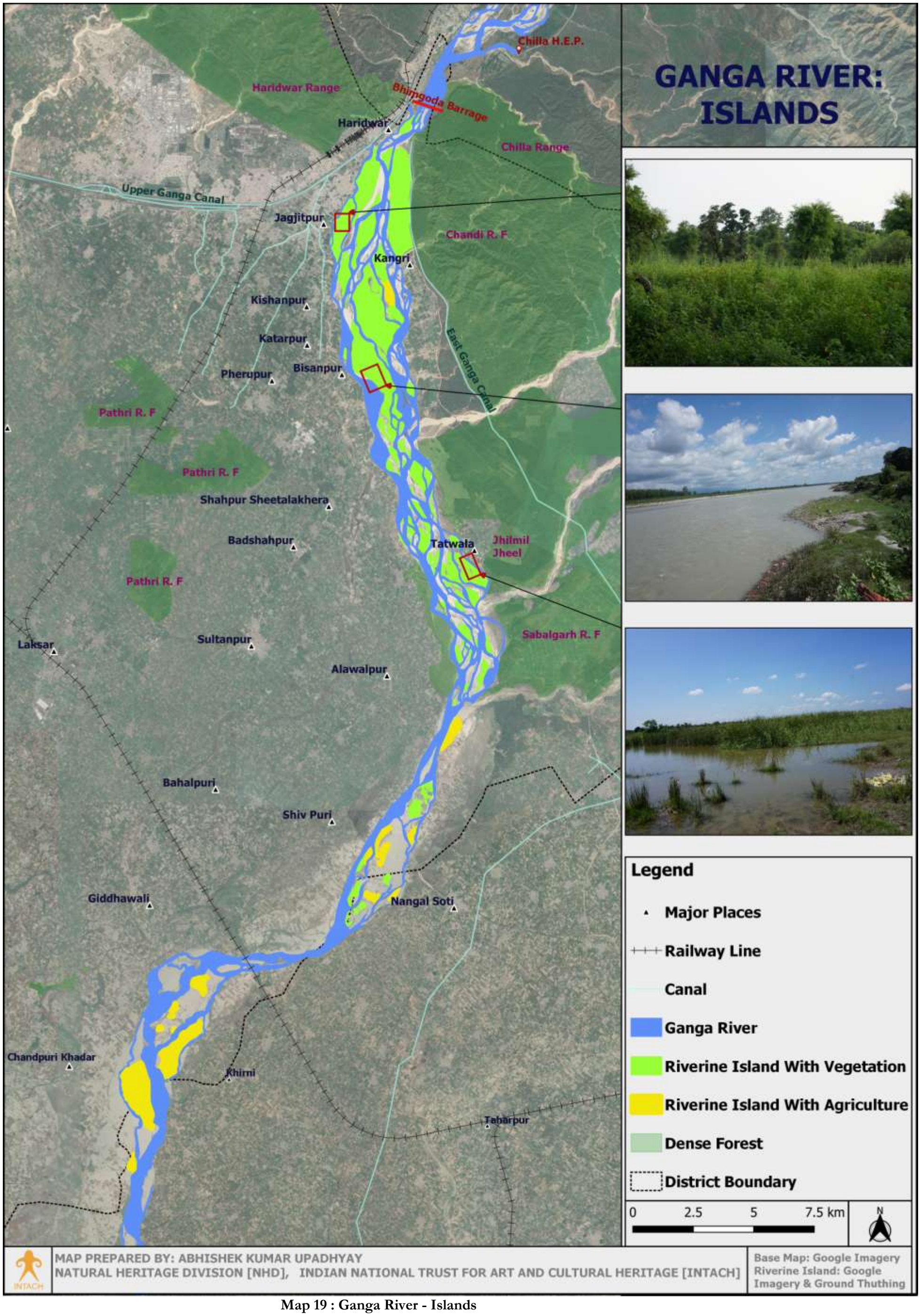
The riverine islands in Jagjitpur were inhabited by dense vegetation including trees such as *Butea monosperma* (Palash), *Bombax ceiba* (Semal) and *Senegalia catechu* (Khair tree). The undergrowth on this island was mainly dominated by *Hyptis suaveolens* (Vilayti tulsi) along with *Ziziphus* sp. (Wild ber) and *Cassia occidentalis* (Badi kasondi). Along with this, the growth of invasive *Parthenium hysterophorus* (Congress grass) was also observed in this region. **According to the locals, most of this vegetation was present because of the ongoing monsoon season and would dry up in the summers.The island upto the Jagjitpur village is also used during Kumbh mela and Shrawan Mela.**

Pic. 159 : Riverine Islands At Jagjitpur Village

In contrast, the riverine islands observed near the villages such as Bisanpur, Katarpur Alipur and Dumanpuri were comparatively thinly vegetated and only Kans grass could be observed on them. **The villagers take their cattle for grazing on these islands when the River water declines post monsoon.**

Pic. 160 : Cattle Grazing Observed On The Riverine Islands Near Katarpur Alipur Village Covered With Kans Grass

Pic. 161 : Riverine Islands Near Bisanpur Village With Luxuriant Growth Of Kans Grass



Map 19 : Ganga River - Islands

Riverine islands were also observed in a village named Tatwala (Dudhiya) close to the Pathari Forest Range where the Jhilmil Jheel Conservation Reserve is situated. **The islands here were densely vegetated with two species of grasses – *Saccharum spontaneum* and *Typha* sp. (Patera grass). The riparian community made use of both these grass species for roof thatching.**

Along with this there was also luxuriant growth of *Ziziphus* sp. (Wild Ber) whose fruits were collected by the riparian community for eating. They also informed about the presence of crocodiles and other wild animals such as leopard, various deer species, elephants. often visiting these areas. Luxuriant growth of *Bombax ceiba* (Semal tree) was observed in the nearby forests whose fruits were used as vegetables. **The vegetation on the islands in this region was also a good source of fodder for the cattle reared by the villagers.**

Pic. 162 : Riverine Islands At Tatwala (Dudhiya) Village Near Jhilmil Conservation Reserve

Table No. 07 : Floral Diversity Of Riverine Islands In Haridwar Distt.

S. No.	Botanical name	Common name	Family	Habit
01	*Bombax ceiba* L.	Semal	Bombacaceae	Tree
02	*Butea monosperma* (Lam.) Taub.	Palash	Fabaceae	Tree
03	*Senegalia catechu* (L. f.) P.J.H. Hurter & Mabb.	Khair	Fabaceae	Tree
04	*Senna occidentalis* (L.) Link	Badi kasondi	Fabaceae	Shrub
05	*Hyptis suaveolens* (L.) Poit.	Vilayati tulsi	Lamiaceae	Shrub

06	*Ipomoea carnea* Jacq.	Besharam	Colvolvulaceae	Shrub
07	*Vitex negundo* L.	Nirgundi	Lamiaceae	Shrub
08	*Ziziphus* sp.	Ber	Rhamnaceae	Shrub
09	*Euphorbia hirta* L.	Bara dudhi	Euphorbiaceae	Herb
10	*Malvastrum coromandelianum* (L.) Garcke	Ghat Patra	Malvaceae	Herb
11	*Parthenium hysterophorus* L.	Congress grass	Asteraceae	Herb
12	*Sida cordifolia* L.		Malvaceae	Herb
13	*Tephrosia purpurea* (L.) Pers.	Purple tephrosia	Fabaceae	Herb
14	*Saccharum spontaneum* L.	Kans	Poaceae	Grass

11.0 Instream Fauna

River Ganga is an important habitat for numerous fresh water fishes, many of which are of commercial importance for the locals. Some important fishes like Mahseer (*Tor tor*), Chinese carp (*Cyprinus carpio*), Indian trout (*Raimas bola*), Rohu (*Labeo rohita*), Singhara (*Wallago attu*), Goonch (*Bagarius bagarius*) are found in the rivers in this region. About 20 fish species were reported from this region with the major dominance of family Cyprinidae. However, the overall fish population in the Distt. especially in areas such as Bhogpur has declined in the last couple of years owing to the disruptive mining practices in vogue (Kamboj & Kamboj, 2019).

Another important species found in the Ganga River is Smooth-coated otter (*Lutrogale pers Picillata*) which is listed as 'Vulnerable' in IUCN Red List. It has been reported from the riverine stretch of Rajaji National Park in the downstream of Bhimgoda barrage in the Distt. (WII-GACMC, 2017).

12.0 Fishing For Livelihood

12.1 Fish Farming In Village Ponds

The water resources such as ponds and lakes are important for fish production and fisheries development for food and trade. An example of such water resource was found just 7 kms away from Haridwar city in a village named Jamalpur Kalan [29°54'7.33"N, 78° 7'18.59"E]. Two ponds, locally known as 'Panjaiwala talab' were present on either side of the Jamalpur road with a temple of Jahakheer Jogi situated in the proximity of one of these ponds.
Interaction with the temple caretaker revealed that these ponds were taken on lease by them for fish farming as a source of livelihood. The fish culture was introduced in the months of May-June in the ponds and was harvested during November-December.

Some of the fish would be sold in the nearby local markets while a major portion was sold off to traders from cities like Roorkee, Dehradun and Delhi. **Major fish species found in the ponds were Rohu (*Labeo rohita*), Katla (*Gibelion catla*), Goonch (Begarius begarius) and Singhi (*Heteropneustes fossilis*).** Among these, the Rohu fish was sold as the most expensive fish in the market as compared to others.

Pic 163 : The Panjaiwala Talab Used For Fish Farming In Jamalpur Kalan Village

Another important fish found in these ponds was the Silver Carp (*Hypophthalmichthys molitrix*) of the carp family (Cyprinidae) which is an exotic species introduced in various regions of India for the purpose of commercial cultivation. Owing to its fast growth, it is one of the popular choices among the indigenous and exotic fishes. A significant population of this carp fish was found to inhabit the Panjaiwala talab forming a major proportion of the fish

harvest from this pond. However, during our survey we found many individuals of this commercially important fish to be dying possibly because of excessive ammonia in the water.

Pic. 164 : A Dead Silver CarpIn Panjaiwala Talab

Pic. 165 : Dead Fish In The Panjaiwala Talab

The caretaker of these ponds also revealed the presence of three different species of turtles – Three striped roofed turtle (*Batagur dhongoka*; IUCN Red List: Endangered), Indian softshell turtle (*Nilssonia gangetica*; IUCN Red List: Vulnerable) and Indian flapshell turtle (*Lissemys punctata*; IUCN Red List: Least Concern). In one of these ponds adjacent to the Jahakheer Jogi temple, people used to worship by offering daliya [porridge] to the water body in the Asad month of

Hindu calendar. A small portion at the edge of this pond behind the temple was also used as a graveyard for burying the dead bodies of small children who died in the surrounding villages. The lotus (*Nelumbo* sp.) was found growing densely in this pond along with Patera grass (*Typha* spp.).

Pic. 166 : Another Part Of Panjaiwala Talab Adjacent To The Temple

12.2 Fishing In Ganga River

Owing to the high religious significance, the consumption and sale of fishes along with any other non-vegetarian product is completely banned in Haridwar and Rishikesh cities. When we interacted with some local inhabitants in different villages such as Bishanpur, Mikkampur-Jeetpur and Ranjitpur away from the main city of Haridwar, everyone was aware of a strict ban on fishing in the main Ganga in the entire Distt..

Furthermore, this supposed fishing ban was also applicable to supporting rivers and streams of Ganga such as Banganga and Begum River. The villagers further claimed that anyone who was caught fishing was immediately arrested by the local police and prosecuted. Despite the fear of this ban, some people used to carry out fishing in the supporting rivers and the main Ganga River. One such evidence was recorded in the Bishanpur village about 13 kms away from Haridwar city.

A local villager used cast net for fishing in the main Ganga by floating on an air-filled rubber tube as against using a boat. On the account of anonymity, he provided information regarding the ban and also showed his collection of fish which was just three individuals despite floating in the river for more than two hours.He claimed that the fish catch has declined sharply in the last couple of years and whatever the small number of fishes he could catch, he used to sell them in the nearby areas for consumption. According to him, the major fishes found in this stretch of Ganga include Mahaseer (Tor tor), Chinese carp (Cyprinus carpio), Rohu (Labeo rohita).

Pic. 167 : A Fisherman Catching Fish Near Bisanpur Village [29°51'25.27"N, 78° 8'39.81"E]

Pic. 168 : Fish Caught From The Main Ganga River By A Local In Bishanpur Village

12.3 Fishing in Solani And Its Tributaries

Despite the supposed ban on fishing in the Distt. and the fear associated with it, fish catching was found to be an important livelihood associated with the inhabitants of a village named in the Jogawala panchayat of Haridwar Distt..

Many people in different age groups were involved in fish catching from a stream which was a tributary of Solani river flowing near the village, also referred to as Solani by the locals. Upon discussion, they revealed the use of a particular type of cage made out of bamboo which was placed in the stream flowing near the village. This cage has a small opening through which the fishes can come in for the bait kept inside and then they get trapped while trying to come out of the cage. The villagers claimed that they could catch upto 3-4 kgs of small fish sometimes and 1-2 kg of medium sized fish.

The common fish found in this river are Guji (*Sperata seenghala*), Singhi (*Heteropneustes fossilis*), Mangur (*Clarias batrachu*) and Rohu (*Labeo rohita*). Most of the fish catch is sold in nearby villages while some part of it is consumed by the local people.

Pic. 169 : The Bamboo Cage Set Up In Solani River For Catching Fish

13. 0 Livelihood Opportunities

- An important observation near Mikkampur Jeetpur village in Haridwar Distt. was the collection of flowing tree logs, twigs and branches in the Ganga River by the local villagers. According to them, they made use of a boat locally made by them for collecting the floating wooden pieces from the river.

- After collection, they dry the wood and use that as fuelwood and for some minor construction purposes. They also claimed that this was purely based on random collections and quantity varies seasonally. This is a major dependency by the locals on the river for fulfilling their essential requirements.

Pic. 170 : Wood Collection From Ganga River By Locals Near Mikkampur Jeetpur Village[Sept., 2019]

14. 0 Ground Water

Geo-hydrologically, Gangetic alluvial plain and Himalayan mountain belt i.e. *Shiwalik* belt are two hydrological regimes of the Distt.. The Gangetic alluvial plain, having vast expanse of alluvium and unconsolidated materials of varying size [boulder to clay] provides a promising zone of groundwater development in the Distt..

Shiwalik belt and *Bhabar* belt covers the Bahadrabad block of the Distt.. *Shiwalik* belt occurs in extreme north and north eastern part of the Distt.. Here, the ground water occurs in the form of spring and seepage. Below the S*hiwaliks*, the *Bhabar belt* extends upto upper Ganga Canal - groundwater in this region is deep and its nature varies between unconfined to semi-confined zones.

14.1 Ground Water Fluctations

Groundwater level of Bahadrabad block ranges between 3.25 m bgl and 13.53 m bgl [CGWB, 2016]. The ground water between Rawasan Rao and Kotwali Rao i.e. left bank of river Ganga has free flowing or artesian like condition.

- ✓ ***Bhabar is the deposit formed along the foothill zone by coalescence of series of alluvial and talus cones, composed of heterogeneous materials ranging in texture from boulders, gravels to sand and silt. It covers the northern part of Ganga and its surrounding area in the Bhadrabad block of the Haridwar Distt..***
- ✓ ***Khadar is the area occupying the flood plains of the rivers and recent sediments deposited by the rivers. It covers the southern part of river Ganga and its surrounding area in the Laksar and Khanpur block of the Haridwar Distt..***
- ✓ ***The stage of groundwater development is 65% and Laksar and Khanpur block are categorized under 'semi-critical' condition.***

South of the Upper Ganga Canal is the *tarai* area where water level is generally shallower in comparison to *Shiwaliks* and *Bhabar* belt. This may be due to effect of upper Ganga canal and tributaries flowing in right bank of river Ganga. The formation along right bank of river Ganga in Bahadrabad [after upper Ganga Canal], Laksar and Khanpur block is Khadar.

- ❖ Krishan et al., 2016 found the average depth to water level of Haridwar Distt. during pre-monsoon is found 10.74 m and in post-monsoon there is a rise of 0.23 m in average water level
- ❖ Central Ground Water Board reported the depth to water level in entire Laksar block in the range of 6 m bgl while the water level in the Khanpur block is less than 4.75 m bgl.
- ❖ The ground water level of villages in right bank of river Ganga in Bhadrabad block is deeper than the Khanpur block followed by Laksar Block.
- ❖ Based on the information gathered from the villagers of Jagjitpur, Jamalpur Jala, Missarpur, Katarpur, Bisanpur Kundi, Chandpur and Bhogpur, we estimated that the ground water level varies between 10-15 mbgl in pre-monsoon and 7-9 mbgl in post-monsoon season. However, some villagers also told us that during monsoon period the water level rises upto 4 m to 5 m in areas close to the river.

- South of the Bhogpur reserve forest, the ground water level in the villages like Shivpuri, Damanpuri and Kalsiya Khurd varies between 9-10 mbgl in pre-monsoon and 6-8 mbgl in post-monsoon season [based on conversation with villagers].

- A village named Tatwala located on the left bank of river Ganga near Jhilmil Jheel has ground level between 7-8 mbgl in pre-monsoon and 5-6 mbgl in post-monsoon season [based on conversation with villagers].

14.2 Ground Water Quality

Krishan et al., 2016 reported that the ground water quality of Haridwar Distt. is safe for drinking as well as irrigation purpose. However, concentrations of $NO3^-$, Cl^- and $SO4^2$ ions are found above the permissible limits. Central Ground Water Board [2016] studied the hydro-chemistry of ground water of Haridwar Distt. and found nature of water to be alkaline. The results of water quality parameters of ground water of villages within the study are tabulated below:

Table No. 08 : Ground Water Quality Parameters of Villages within Study Area

Location	**Parameters**												
Village	1	2	3	4	5	6	7	8	9	10	11	12	13
Khanpur	8.2	630	366	21	0.19	ND	80	180	40	19	74	7	19
Dallawala	8.05	800	403	43	0.1	0.94	45	230	60	19	88	8.1	20
Sarai	7.66	756	342	35	0.17	31	43	230	60	19	35	72	17
Dhanpura	8.04	588	256	28	0.13	36	44	270	52	34	22	4.8	20
Shahpur Shitalkhera	7.98	730	342	28	0.21	41	42	310	68	34	19	36	20
Bikhampur	7.76	585	317	14	0.23	0.18	30	280	60	32	17	4.3	23
Bhogpur	8.19	940	427	43	0.23	25	67	350	84	26	39	91	22
Sultanpur	7.70	1095	415	85	ND	49	82	435	92	50	62	20	23
Dudha Dayalwala [Tatwala]	7.84	537	281	14	0.05	0.1	34	225	56	21	22	2.2	24
Lal Dhang	7.85	572	305	7.1	ND	8.3	35	280	88	15	15	1.5	17
Shyampur	7.86	598	336	14	0.01	15	21	295	72	28	8.7	3.4	19

1 – pH, 2 – EC (Ms/cm at 25℃), 3 - HCO3, 4- Cl, 5 – F 6- NO3, 7 – SO4, 8 – TH AS CaCO3, 9 – Ca, 10 – Mg, 11 – Na, 12 – K, 13 – SiO2 [Concentration in Mg/l]

Source: CGWB, 2016

People of village Bhaktapur, Damanpuri and Bisanpurinformed that they usually bore hand pumps to a depth of 45 m to 50 m because the water extracted from the depth of 25 m to 30 m is of poor quality. The water gets yellowish in colour after keeping it for half an hour. The villagers claimed that they are suffering from several diseases including cancer due to drinking of this ground water. People also claimed that their handpumps

dry up in the month of April- May, so they usually prefer to bore handpumps upto 50m depth.

15.0 Flood Events

Floods in Ganga River have been very common and their cause is attributed to heavy downpour in the higher altitudes upstream. The inflow of water in river Ganga is regulated at the northern end at Bhimgoda Barrage. The gates of barrage generally open during high precipitation and heavy inflow from upstream. Downstream of the Barrage the rivers joining from the left bank of river Ganga carry heavy inflow during monsoon period causing flooding in the southern part of the Distt..

The flood events are normally reported in monsoon season when water level of river Ganga goes at or above 293 mamsl. In recent years, the river caused major flood events during 1978, 1989, 1994, 1996, 1998, 1999, 2002, 2003, 2009 and 2013 [Nandargi & Shelka; 2018]. In years 1978 [Ganga water level - 295.78 m] and 2010 [296.3m] the Distt. has experienced peak flood scenario.

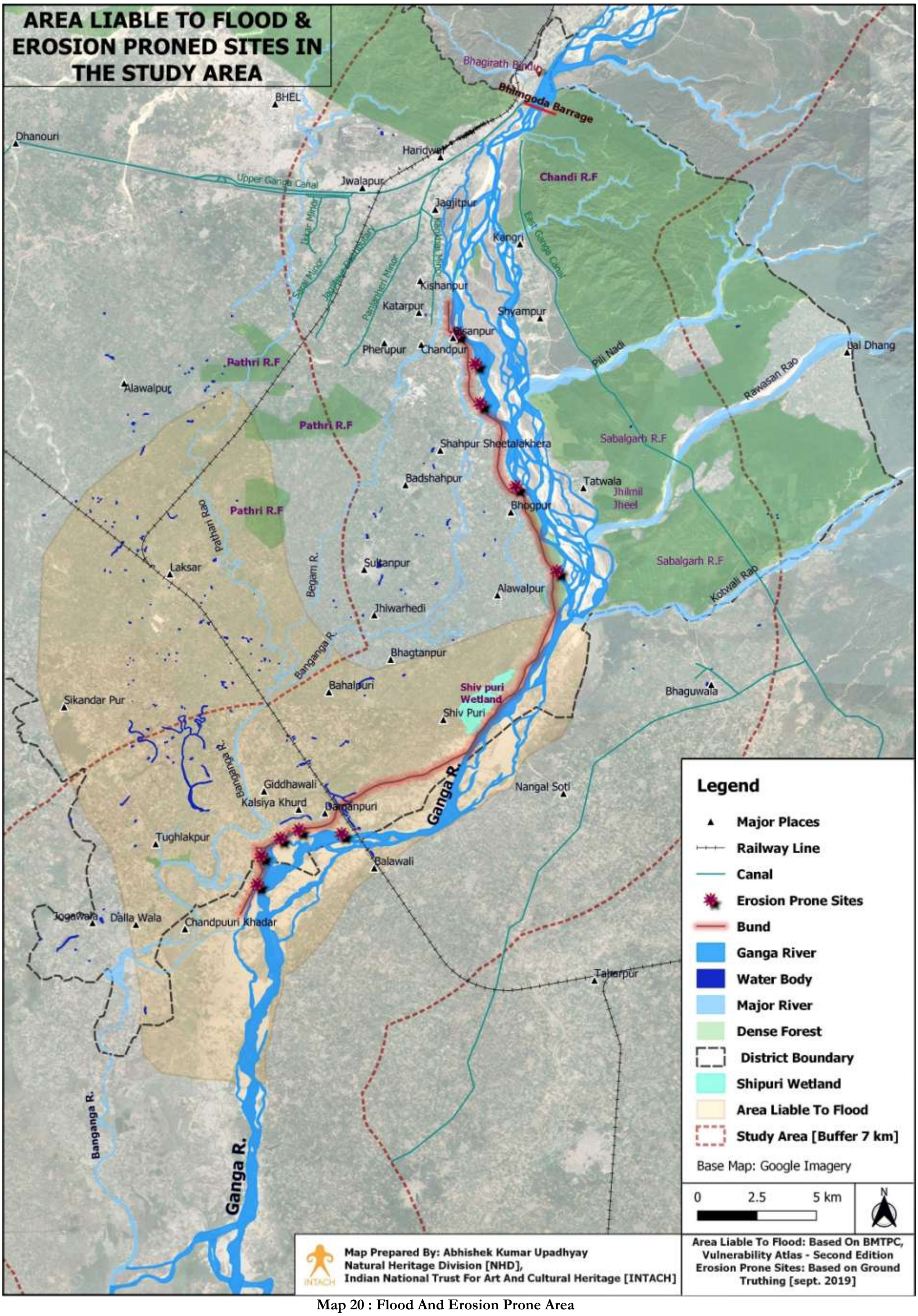
The right bank of River Ganga is prone to flood due to flat surface and lack of riparian vegetation. In recent years, a flood control bund constructed along river Ganga has decreased the severity and frequency of the flood in the study area.

Table No. 09 : Ganga Water Level At Bhimgoda Barrage, Haridwar

Normal Level [NL]	290.0 M
Warning Level [WL]	293.0 m
Danger Level DL]	294.0 m
Highest Flood Level [HFL]	296.3 m
HFL Attained Date	19.09.2010

Source: CWC

Pic 171 : Water Level [291m on 22 Sep/2019] At Bhagirath Bindu U/s of Bhimgoda Barrage]



Map 20 : Flood And Erosion Prone Area

16.0 Bank Erosion

16.1 Erosion Along Ganga River

Flowing water is one of the major agents of erosion like glacier, wind and ground water. Heavy rainfall in the upstream stretch of river Ganga and its tributaries transport sediments like pebbles, gravels and sand to downstream stretches. Here, the sediments collide with the river bank causing corrosion of the river bank, also called bank erosion or lateral erosion. The action of flowing water could be easily observed at the right bank of River Ganga; especially, from village Bisanpur to the south of village Klasiya Khurd [Ref. Map 20]. The erosion activity is maximum near village Bisanpur and Damanpuri [Ref. Pic 172]. However, the constructed flood control bund is decreasing the severity of bank erosion [Ref Map 20].

The area between the flood control bund and the Ganga river is more susceptible to erosion. In our conversation with the local people, the villagers of Damanpuri claimed that the river bank from railway bridge [29°38'28.60"N, 78° 6'0.02"E] to the north of village Ramsahajwala [29°37'37.45"N, 78° 3'43.14"E] has witnessed maximum erosion in the entire stretch of River Ganga. A resident from Damanpuri informed that he had lost 2 ha in the last year's flood.

Pic. 172 : Eroded Bank Near Village Damanpuri

16.2 Erosion Along Tributaries

Erosion activities are negligible along the banks of tributary streams of the right bank. This is because of the anaemic flow in Begam river and Banganga river. In the left bank of river Ganga; the river Pili, Rawasan Rao and Kotwali Rao show vertical erosion. The eroded river bed could be easily seen at the confluences of Ghansi Ram Ka Sot [Ref. Pic 173], Bhai Khan Sot, Sidh Sot, Pili Nadi, Rawasan Nadi and Kotwari Rao.

Pic. 173 : River Bed Sediment Deposition Before The Confluence Of Ghansi Ram Ka Sot And Ganga River

17.0 River Bed Mining

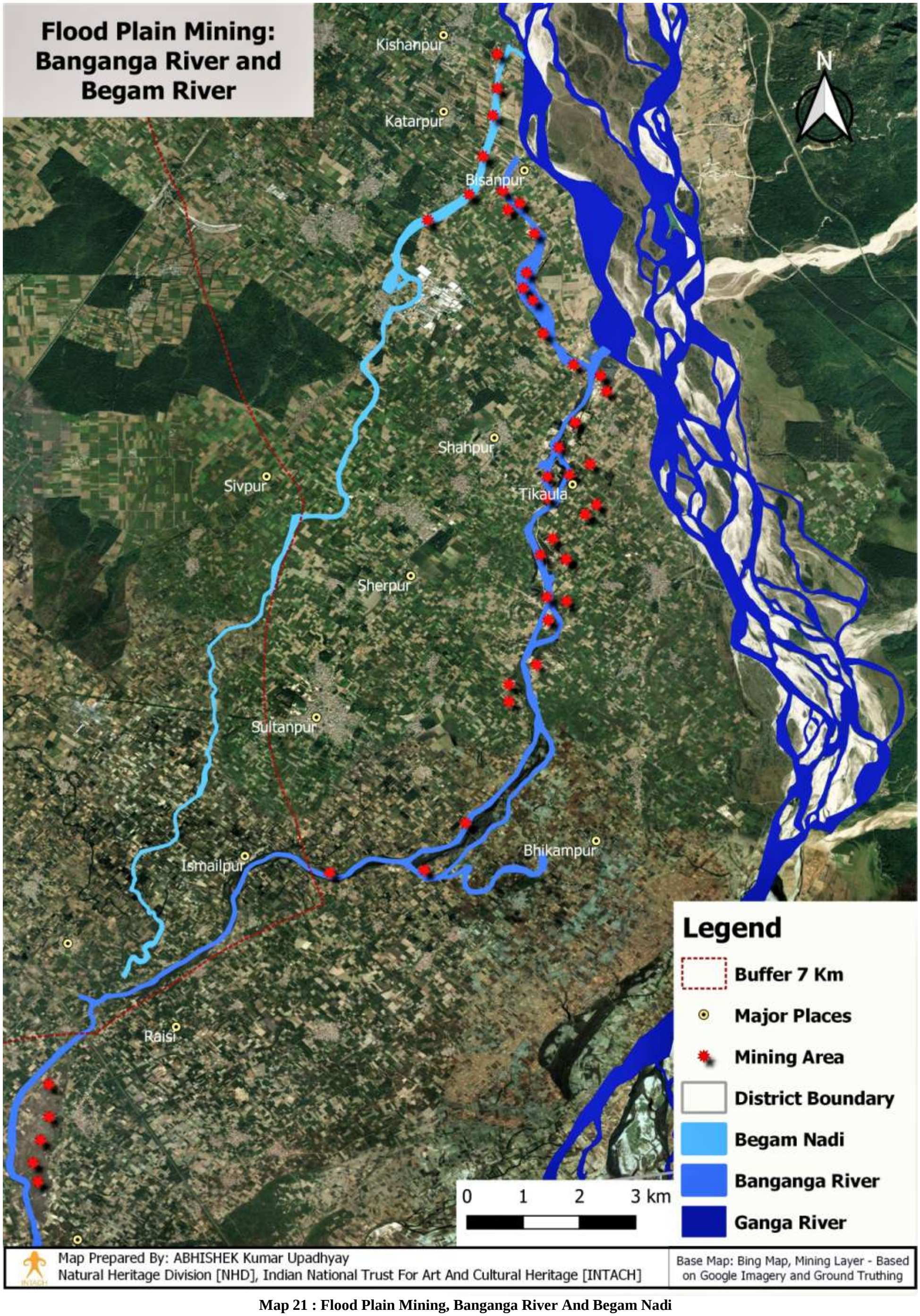
Rampant, uncontrolled and illegal river bed mining has become a major environmental issue in recent times. Major rivers like Ganga are suffering the impacts of river bed mining. However, there are many other small rivers and streams which have over the period of time silently borne this burden without receiving attention. Even in Haridwar Distt., Ganga River and its tributaries are under pressure from this hazard which has increased in the last couple of years owing to the increasing demand for raw materials.

During the survey in Haridwar Distt., it came to light that one of the important tributaries of Ganga – Ban Ganga river which is linked to many important mythological significances in the region, was getting destroyed under pressure of rampant river bed mining throughout its stretch in most parts of the Distt. At one such place near Ismailpur village, mined sites in the Ban Ganga river bed were observed which were filled with water. Another mining site was observed near Katarpur village in Haridwar tehsil [Ref. Map 21] where stone and gravel were being mined and crushed in close proximity of the river.

Pic. 174 : A Stone Crusher Unit In Banganga River Bed, Near Bisanpur

Pic. 175 : A Mined Area Filled With Water At Latitude 29°50'38.56"N &Longitude 78°8'49.93"E

Pic. 176 : Stone Crusher Unit At The originating Point Of Banganga River



Map 21 : Flood Plain Mining, Banganga River And Begam Nadi

18.0 River Structures

The Bhimgoda barrage near Hari ki Pauri in Haridwar came into existence during 1854 when Lord Dalhousie inaugurated the ambitious project for diverting Ganga River water for irrigation purposes [Ref. Map11]. Since then, the Bhimgoda barrage has been twice renovated with the final construction taking place in 1979. The Barrage is 455 m (1,493 ft) long and sits at the head of a 23,000 sq.km. catchment area. It contains 15 spillways gates and 7 under-sluice gates, all 18 m wide. The flood discharge capacity of the barrage is 19,300 cumecs. It has also become one of the major attractions today due to the presence of Neel Dhara Bird Sanctuary nearby [Ref. Pic. 177].

Pic 177 : Bhimgoda Barrage

19.0 Impact Of Embankment

The right bank of the River Ganga is prone to flood and lateral erosion. To mitigate this problem a flood control bund [Ref. Map 20, Pic. 178] was constructed along right bank of river Ganga from east of Katarpur village [29°52'19.07"N, 78° 8'32.68"E] to south of village Ramsahajwala [29°36'26.86"N, 78° 3'7.65"E].

Pic. 178 : Flood Control Bund And River Ganga Near Village Damanpuri

The constructed bund has controlled the flooding in the nearby areas. But it has also impacted the natural factors negatively as noted below.

19.1 Impact On River Flow

- Begam and Banganga rivers originate from river Ganga in the right bank of river near village Kishanpur and Bisunpur village [Ref sec. 3.2]. These rivers were once able to get direct inflow from Ganga throughout the year. But after the construction of flood control bund, the inflow channel closed completely [Ref.Pic. 179] Lack of inflow has resulted into the dry river bed of Begam and Banganga river.

- The U.S. Army Map based on Survey of India (SOI) toposheets [1913-1940] shows the flowing condition of both rivers. However, the originating point of the rivers were depicted as dry river bed. This may be due the less inflow during lean period.

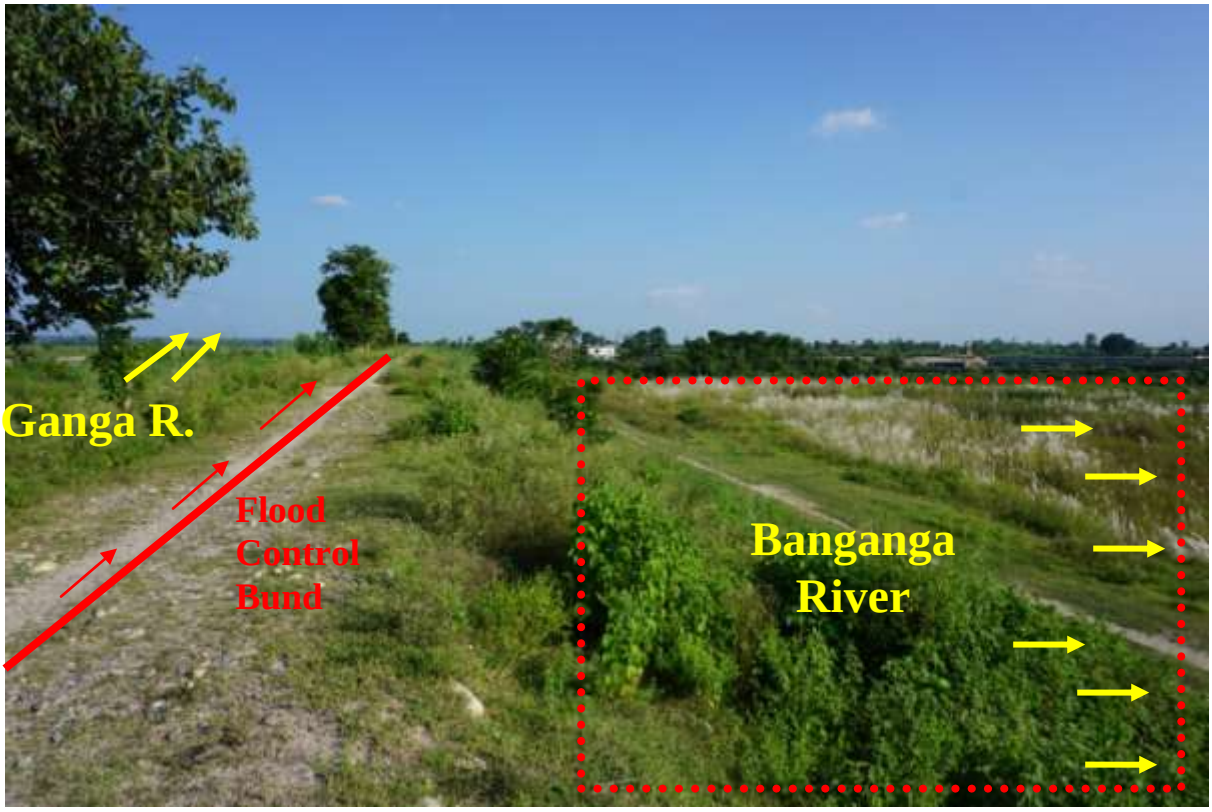
- **This was also confirmed by the local people of Katarpur and Bisunpur that the river Banganga was flowing through their village. They mentioned that the originating point of river Banganga usually flooded in monsoon period and dries up in summer season.**

- The recent SOI toposheet [OSM H44M1, 1st Edition 2011] is showing dry river bed of Banganga river upto Ramkundi [29°49'30.05"N, 78° 9'11.97"E] and Begam Nadi upto Dhanpura (Padartha) [29°49'54.42"N, 78° 7'6.15"E].

- In satellite imagery of 2019 [03.07.2019, from Google Earth Pro], it was observed that the Begam river completely dries up throughout its stretch. However, the River Banganga is found to be in flowing state after the confluence of Pathri Rao.

- ***Lokesh Sahni, a 37-year-old villager of Bhaktanpur claimed that the Banganga had a robust flow during his childhood. He mentioned thathe had seen the riverine island and flooded condition in the river. Another villager told us that, the constructed bund and the mining activities in the river have ruined the identity of Banganga River.***

- Presently, the originating places of river Banganga and Begam Nadi are used for Mining activities [Ref. Pic 180], settlements [Ref. Pic 184], cow shelters [Ref.Pic182] and solar power generation [Ref. Pic 183].



Pic. 179 : Confluence of Banganga And Ganga River [29°49'22.98"N, 78° 9'33.36"E]

Pic. 180 : Abandoned Stone Crusher Unit [Himalayan Stone Crusher, 29°52'43.43"N, 78° 8'21.67"E] At The Origination Point of Begam Nadi

Pic. 181 : A Water Storage Tank [29°52'49.35"N, 78° 8'22.25"E] In The River Bed OF Begam Nadi

Pic 182: A Cow Shelter [29°51'35.79"N, 78° 8'36.11"E] At the Origination Point of River Banganga, Bisunpur Village

Pic 183 : Solar Power Plant At The Origin Site Of Banganga River

Pic. 184 : A Gujjar Basti At The Originating Site Of Banganga River

19.2 Potential Threats To Small River Channels

Those channels which usually get flooded during flood pulsing and monsoonal rains are now unable to receive water from Ganga. This is because of the constructed flood control bund along river Ganga from originating point of Begam nadi to southern end of the Railway Bridge; latitude 29°36'26.74"N and longitude 78°3'8.04"E [Ref. Map 20].

A channel crossing through Bhogpur R.F and another channel through Shivpuri wetland [Ref sec. 00] have now disappeared because of high siltation rate and blocked confluence point due to constructed bund. The satellite imagery of 2006 [Ref Map 22] is showing a channel of Ganga river flowing upto the wetland while the same channel has disappeared in satellite imagery of 2019. Map 21 and 23 clearly shows blocked originating point of the river channel.

Map 22 : Satellite Image [28.10.2006] Showing Shivpuri Wetland, River Channel and Ganga

Map 23 : Satellite Image [29.03.2019] Showing Shivpuri Wetland, River Channel, Ganga and Intervening Bundh

19.3 Impact On Wildlife Habitat

Shivpuri Wetland [Ref sec. 7.2] is an important flood plain wetland in the Haridwar Distt. It lies south of Bhogpur Reserve Forest near village Shivpuri. The wetland provides habitat to several swamp deer, chitals and mugger crocodiles. It also provides habitat to several resident and migratory birds and also constitutes the migratory route for swamp deer.

The wetland is dependent on precipitation and the river Ganga for its inflow and outflow during flood pulsing. After the construction of flood control bund, the mechanism of flood pulsing has been totally stopped. In the long run the wetland may dry, which will severely affect the biota of the region.

Pic. 185 : Shivpuri Wetland and Flood Control Bund

20.0 Sacred Old Trees In Haridwar

Most of the distinct belief systems found across the globe involve natural areas which are considered to be sacred. These beliefs often include myths, taboos and stories which pass on generation after generation resulting in safeguarding of natural ecosystems and its various elements. These key links between the faiths and conservation of natural elements have led to the formation of Sacred Natural Sites which can be aptly defined as "areas of land or water having special spiritual significance to peoples and communities" (IUCN, 2008).

In a mega-diverse country like India, scores of such sacred sites find their co-existence with the human habitations. Might rivers like Ganga have been an integral part of cultural and religious practices since time immemorial and have been documented time and again. However, there are still some small yet significant sacred elements which are not recorded or taken note of in different areas. During this survey along Ganga river in Haridwar Distt., a few important sacred sites were identified which have been associated with local taboos and beliefs.

20.1 Sacred Trees Near Panchleshwar Mahadev Temple

The presence of sacred trees was found close the Panchleshwar Mahadev Temple located near Ismailpur and Jhiwarhadi villages of the Distt.. The temple is surrounded by lush growth of old trees which are linked to the stories of Mahabharata. According to one such popular tale, when Bhishma Pitamah and his step-mother Satyavati were sitting and chatting on the bank of River Ganga, his step-brothers Vichitravirya and Chitrangad spied on them. They suspected an affair but felt repentant when they found out that this was not the case. A learned sage suggested to them to find a place where five peepal [*Ficus Religiosa*] trees were growing together near Banganga river and do penance by lighting a fire around them at that place. Thus, the two brothers reached Panchleshwar Mahadev temple and found the desired cluster growing close to the river. Since then, this place is considered to be very holy and the trees were considered to be sacred.

In the course of time, four of these trees vanished from this site and only one Peepal tree is surviving below which a small temple of Guru Gorakhnath was constructed by the local villagers [Pic. 186]. Daily puja is conducted two times in a day at this site and an annual festival is also arranged where people from nearby villages visit this holy place.

Pic. 186 : A Person Offering Prayers At The Sacred Tree Temple Near Panchleshwar Mahadev Mandir

20.2 Sacred Tree In Balkumari Temple

Another example of sacred trees was observed in the campus of Balkumari Temple located on the banks of River Ganga near Katarpur Alipur village. The priest of this temple mentioned about few old trees such as Peepal, Aam and Rudraksh which are thriving in the temple premises. However, among these, the Peepal tree is believed to be more than 70-80 years old and has a religious importance. Owing to this, everyday people visit this place for offering their prayers to this tree during morning and evening time.

Pic. 187 : Sacred Peepal Tree At The Balkumari Temple Near Katarpur Alipur Village

20.3 Sacred on Ganga Banks

Several old trees were found to be present on the Guru Karshni Ghat and Maharaja Agrasen Ghat located in Bhoopatwala area about 3-4 kms away from Hari Ki Pauri in Haridwar. Most of these old trees were protected owing to the temples and ashrams constructed along the banks of River Ganga.

Several different types of Pujas were conducted under these trees by the local priests of this area. These sacred old growth trees included – *Ficus religiosa* (Peepal), *Ficus benghalensis* (Vad), *Ficus glomerata* (Gular), *Syzygium cumini* (Jamun), *Trewia nudiflor*a (Pindalu) and *Emblica officinalis* (Amla). Owing to their venerable age and protection by the locals, these trees had huge canopies providing shade to pilgrims and sadhus.

Pic. 188 : Old Peepal Tree (*Ficus religiosa*)Associated With Temple On Guru Karshni Ghat

Pic. 189 : Old Peepal Trees (*Ficus religiosa*) And Gular (*Ficus glomerata*) On Guru Karshni Ghat

Pic. 190 : Old Trees Of Vad(*Ficus benghalensis)* And Pindalu (*Trewia nudiflor*a) At Maharaja Agrasen Ghat

Pic. 191 : An Old Tree Of Jamun (*Syzygium Cumini*) On Guru Karshni Ghat

Pic. 192 : An Old Tree Of Amla (*Emblica officinalis*)At Guru Karshni Ghat

21. 0 A Photographic Journey Of River Ganga

Pic 193 : Chilla H.E.P. [U/S Haridwar]

Pic 194 : Bhimgoda Barrage And Haridwar City

Pic 195 : Ganga River In Haridwar City

Pic 196 : Idol inGanga River

Pic 197 : A Distributary Of River Ganga Near Jagjitpur Village

Pic 198 : River Ganga From Balkumari Temple Showing Riverine Island

Pic 199 : A Stone Crusher Unit In The Ganga Flood Plain, Bisanpur Village

Pic 200 : Poplar Tree Plantation At The Bank Of River Ganga, Bisanpur Village

Pic 201 : Ganga River At The Originating Site Of Banganga River

Pic 202 : Stagnant Water Of Banganga River, Near Panchleshwar Temple

Pic 203 : Jhilmil Jheel : A Flood Plain Wetland

Pic 204 : Ganga River Active Flood Plain Near Damanpuri Village

Pic 204 : Banganga River Near Badshahpur Reserve Forest

11. 0 ANNEXURE

Sewage Treatment Plant At Gangotri

Extent Of Deforestation On Slopes

Vegetation In Patches

Large Number Of Pilgrims In Gangotri

View Of Bhagirathi Peak From Gangotri

Poor Solid Waste Disposal In Gangotri

Unmonitored Construction In Gangotri Town

Pinus Wallachiana At Gangotri.

Sapt Tal Lakes

Traditional Irrigation Techniques Known As Guls In Bhagirathi Valley

Small Hydroelectric Projects In The River

Terrace Farming In The Bhagirathi Valley

Numerous Waterfalls In The Region

Glaciers Feeding Small Streams In The Region

Lush Green Pine Forest At Chirbasa

Five Finger Cinquefoil *(Potentilla cuneata)*

Flycatcher Sand Wort *(Arenaria Bryophylla)*

Himalayan Geranium *(Geranium Himalayense)*

Cedar Apple Rust

Lichen Caloplaca Specie

Rock Foam Lichen Stereocaulon Saxatile

Lichen Usnea Filipendula

Lichen Hypogmnia Species

Apple Orchards At Harsil.

Medicinal Plants Found In The Region With Their Common Name And Uses.

Plant Name	Common Name	Uses
Aconitum atrox	Mitha	Rheumatism, paralysis
Aconitum heterophyllum	Atees	Fever, cough & stomachache
Aconitum violaceum	Dudh Atees	Rheumatism
Anemone rivularis	Ratanjot	Cuts & Wounds
Delphinium vestitum	Nirbishi	Body swelling
Thalictrum foliolosum	Panglajari	Eye inflammation, Snake bite
Cissampelos pariera	Pari	Cough, Dysentery, Piles
Paeonia emodi	Chandrain	Uterine diseases
Berberis aristata	Kingor	Rheumatism, fever, eye diseases
Podophyllum hexandrum	Ban Kakadi	Septic wounds
Meconopsis aculeate	-	Backache
Corydalis govaniana	Indrajata	Swelling of the limbs and stomachache
Megacarpia polyandra	Barmoola	Fever, Stomachache
Viola bifora	Banfsa	Constipation
Viola canescens	Dudibirali	Headache, cold, cough & malaria
Malva verticillata	Ageli	Urinary complains
Geranium nepalense	-	Antibacterial & Astringent
Geranium wallichianum	Kaphla	Dysentery and Cold
Oxalis corniculata	Chalmori	Fever, Urinary tract infections
Boenninghausenia albiflora	Upanaya Ghas	Cuts & Wounds
Skimmia anquetilia	Nair, Kedar Pati	Burns
Zanthoxylum armatum	Timur	Toothache, grain storage
Astragalus candolleanus	-	Skin diseases& blood purifier
Bauhinia vahlii	Malu	Aphrodisiac
Bauhinia variegate	Gwiral	Biliousness, ulcers & Tuberculosis
Potentilla fulgens	Chotu Ruins	Strengthening of teeth
Prinsepia utilis	Bhinkula	Pile, Stomach disorders
Pyrus pashia	Mehal	Stomach disorders
Rosa sericea	Dhur- Kunja	Headaches, Liver complaints
Bergenia ciliate	Pattharchor	Fevers, Diarrhoea & Pulmonary infections
Bergenia stracheyi	Pashan Bhed	Toothache, swelling & sores
Parnassia nubicola	Nirbishi	Boils
Sedum quadrifidum	Suru	Headache, Piles
Angelica glauca	Chora	Dysentery, Constipation
Pleurospermum densiflorum	Tagger	Medico- Religious
Selinum vaginatum	Bhootkeshi	Toothache
Galium aparine	Kushkusha	Stop bleeding
Rubia manjith	Manjistha	Lower blood pressure, kidney stone
Nardostachys grandiflora	Jatamansi	Heart tonic
Valeriana hardwickii	Shami	Wounds
Morina longifolia	Bis Kandara	Burns & Boils

Anaphalis triplinervis	Buglya	Dressing wounds
Eupatorium adenophorum	Basinga	Skin diseases
Jurinea dolomiaea	Dhoop	Incense, Fever
Saussurea gossypiphora	Hiyun Kauni	Asthma, Skin diseases
Saussurea obvallata	Brahm Kamal	Cough
Tanacetum longifolium	Guggal	Stomachache & Indigestion
Taraxacum officinale	Kan-fulya	Blood purifier
Gaultheria trichophylla	Bhuinla	Rheumatism, Appetizer
Rhododendron anthopogon	Kodya	Stimulant for aged people
Rhododendron arboreum	Burans	Headache, Blood, dysentery
Syringa emodi	Ghiya	Fever
Gentiana stipitata	Bumlya	Fever
Swertia chirayita	Chirayata	Blood diseases
Swertia ciliata	Kala Chirayata	Blood purifier
Arnebia euchroma	Laljari	Wounds, Fevers, Bites and Stings
Cuscuta europaea	Akash-laguli	Reduce ear pain
Datura stramonium	Dhataru	Relieve pain & encourage healing
Picrorhiza kurrooa	Kutaki/Karui	Fever, Stomachache
Verbascum thapsus	Akuluber	Ulcers, Tumours & Piles
Dicliptera bupleuroides	Saundi	Fever, Stomachache & Skin diseases
Ajuga brachystemon	Rajpatti	Stomachache
Elsholtzia strobilifera	Pothi	Wounds
Lamium album	Tilka	Bleeding after childbirth
Leucas lanata	Guma	Wounds, Eye infection
Micromeria biflora	Honsala	Snake bite, healing
Origanum vulgare	Ban-Tulsi	Toothache, Swelling
Prunella vulgaris	Phulari	Wounds, Ulcers, Sores
Salvia hians	Amlya	Colds, Coughs, Anxiety
Thymus linearis	Ban-Ajwain	Cuts & Wounds
Achyranthes bidentata	Lich-Kuru	Muscular cramps
Chenopodium botrys	Bithhu	Diuretic
Bistorta affinis	Kukhari	Dysentery
Rheum australe	Archa	Internal wounds
Rumex nepalensis	Jangli Palak	Itching
Euphorbia pilosa	Mahavir, Daya	Food poisoning
Girardinia diversifolia	Dud-Kanali	Diuretic
Urtica dioica	Kandali	Boils
Juglans regia	Akhor	Toothache
Myrica esculenta	Kaphal	Skin disease, Wounds
Carpinus viminea	Chamkharik	Bone fracture
Dactylorhiza hatagirea	Hathajadi	Cuts, stop bleeding, Aphrodisiac
Pholidota articulate	Harjojan	Bone Fracture
Roscoea alpina	Garud Panja	Urinary diseases & Tuberculosis

Dioscorea deltoidea	Gethi	Bronchial cough
Allium stracheyi	Faran	Cold, Spices
Allium wallichii	Ban Lahsun	Indigestion
Nomocharis oxypetala	Ban Pyaj	Vigorous
Paris polyphylla	Satwa	Used as nerve tonic
Polygonatum verticillatum	Mahamaida	Gastric complaints
Trillidium govanianum	Satawa	Energetic
Acorus calamus	Vachha	Cough, kidney & Skin diseases
Adhatoda zeylanica	Banshoi	Bronchitis and asthma
Ainslaea aptera	Dande ka kadu	Gastric
Artemisia roxburghiana	Asteraceae	Piles
Asparagus curillus	Sharanoi	Acne
Ageratum conyzoides	-	Healing in cuts
Bistorta anplexxicaulis	Ninai	Ear ache, acne
Boehmeria plattyphylla	Chauna	Wounds healing
Boerhaavia diffusa	Phurnoi	Swelling
Calotropis procera	Aank	Boils
Cedrus deodara	Deodar	Itching (animals)
Centella asiatica	Brahmi	Headache
Cynodon dactylon	Doob	Dysentery
Betula willis	Bhojpatra	Fever and body pain
Cannabis sativa	Bhang	Bronchitis, Impotency & Asthma
Callicarpa macrophylla	Daiya	Rheumatic pain and mouth ulcer
Carum carvi	Kala zeera	Fever, toothpaste and headace
Cicerbita macrorhiza	Kararu	Fever and headache
Delphinium denudanum	NIrbisi	Intestinal pain
Macroryloma uniflorum	Gahaih	Kidney stone and intestinal pain
Hedychium spicarum	Banhaldi	Asthma and bronchitis
Megacarpaea polyandra	Barmola	Asthma, Dysentery and stomach ache
Nicotiana ruspica	Hamaku	Skin sores and blisters
Nardostachyx jatamansi	Jatamansi	Heart disease, blood pressure, insomnia
Orchis chusua	Hatha	Fever and cough
Phaseolus vulgaris	Sem	Skin disease
Pimpinella diversifolia	Bazeer	Gastric disorders
Raphanus sativus	Muli	Jaundice and diabetetes
Rhus parviflora	Tungla	Teeth problems
Selinum vaginatum	Bhutkeshi	Muscle pain and skin disease
Trigonella foenum graecum	Meshi	Obesity, joint pain, indigestion

(Source: Semwal et al. 2010, Bartwal et al. 2011, Singh et.al 2011)

Fauna

The region ranges from area with dense deciduous forest to permanent snow covered areas, which provide a diverse habitat for a variety of fauna. The area is home to a number of mammals, reptiles and birds. The Bhagirathi Valley falls under the Gangotri National Park, a protected area and thus is home to some of the most fascinating and endangered fauna in the world. As the entire region can be classified into temperate, sub alpine and alpine tracts the faunal composition of the area also varies from altitude ranges.

The temperate region marked by Pine, Oak, and Deodar forest lies in the middle ranges of the river basin. The fauna of the region is well adapted to the extreme climatic conditions of the temperate region and can withstand cold and harsh mountain conditions. These animals are also adapted to the topography and can easily move around steep slopes or snow covered areas. Some of the animals in this region migrate with changing season to higher and lower altitudes. Altitude migration is mostly observed in Ungulates and Birds who move to lower altitudes when the upper regions are covered with snow and move up again when the snow melts and food is available. With the movement of prey the carnivores of the region also move along the altitudes. A huge variety of wildlife is witnessed in this region. Species of ungulates including Himalayan Goats and Deer, Wild Cats and large Cats, Bears, Wolfs, Foxes, Pheasants and Prey Birds are found in the region.

The Sub-Alpine and Alpine region comprises of Alpine meadows and the areas beyond snow line. The region beyond bhojwasa, fall under this zone. The animals of this region are mostly under endangered category and comprises of Snow Leopards, Musk Deer, Marmots, Wild Goats, Sheep, Yaks, Himalayan blue sheeps etc.

Holly blue Butterfly at Gangotri

Blue-capped Redstart

Rose finch

White Wagtail

Rock Bunting

Blue Fronted Redstart

Alpine Cough at Gangotri

Oriental Turtle Dove

Some animals that are found in the National park include:

Mammals: Tiger(*Panthera tigris)*, Leopard(*Panthera pardus*), Snow Leopard(*Panthera uncia*), Leopard Cat(*Felis bengalensis*), Jungle cat(*Felis chaus*), Rhesus Macaque(*Macaca mulatta*), Common Langur(*Presbytis entellus*), Small Indian Civet(*Viverricula indica*), Common Palm Civet (*Paradoxurus harmaphroditus*), Himalayan Palm Civet(*Paguma larvata*), Wolf(*Canis lupus*), Jackal(*Canis aureus*), Red fox(*Vulpes vulpes*), Brown

Bear(*Ursus arctos*), Himalayan Black Bear(*Selenarctos thibetanus*), Yak(*Bos grunniens*), Bharal or Blue Sheep(*Pseudois nayaur*), Ibex (*Capra ibex*), Markhor (*Capra falconeri*), Himalayan Tahr (*Hemitragus jemlahicus*), Serow (*Capricornis thar*), Goral(*Nemorhaedus goral*), Muntjac or Barking Deer(*Muntiacus muntjak*), Musk Deer(*Moschus moschiferus*), Common Otter(*Lutra lutra*), Stone Marten(*Martes fiona*), Yellow Throated Marten(*Martes flavigula*), Himalayan Weasel(*Mustela sibirica*), Flying Squirrels, Himalayan Marmots(*Marmota bobak*), Royal Vole(*Alticola roylei*), Indian Porcupine(*Hystrix hodgsoni*), Himalayan Mouse Hare(*Ochotona roylei*),

Fishes: Katli(*Acrossocheilus hexagonolepis*), Kalta or Catla(*Catla catla*), Chenga or Dheridhok(*Channa gachua*), Mrigala or Mori(*Cirrhinus mirgala*), Gauma or Behrah(*Crossocheilus latius*), Chela or Aptaere(*Cyprinus carpo*), Patharchatta or Ghorpola(*Garra lamta*), Labeo, Gunguch or Gupkari (*Lepidocephalichthys guntea*), Trout(*Salmo trutta fario*), Mahasheer or Sor maccha(*Tor tor*), rare Golden trouts at Dodital.

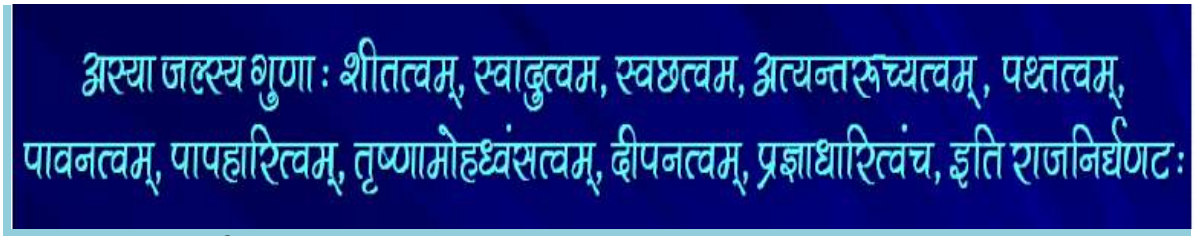
Reptiles: Variety of Poisonous and non-poisonous snakes like Checkered Keelback water snake (*Xenochrophis piscator*), Himalayan Cat Snake (*Bioga multifascicata*), Indian Spectacled Cobra (*Naja naja*), King Cobra (*Naja hanna*), Russel's Viper (*Vipera russellii*), Indian Rock Python (*Python molurus*) and many other. Crocodiles, Lizards and Tortoise are found in Terai Bhabar area.

Avifauna: Babblers, Warbler including Himalayan jay(*Garrulus bispecularis*), Himalayan Treepie, Himalayan Tits Warbler, Crested Garrulax, Variegated Laughing Thrush, Streaked Babbler, Bulbuls, Nut Hatchers, Crested Wren, Paradise Flycatchers, Prey birds like Himalayan Bearded Vulture, Brahminy Kite, Common Eagle and wind hover these birds are important scavangers of the region. Pheasants are the most common bird species found in the area. The Chir pheasant, Monal Pheasant, Tragopan Pheasants, Khalij Pheasant, Jungle Fowl etc.are some important species. Buntings, Wagtails and Fantails are also very common. Other birds include Thrushes, Swallows, Swifts, Kingfishers, Woodpeckers, shrikes, Orioles, Robins, and Redstarts. The area is also an important migratory route for Ducks, Cranes and other Siberian birds that migrate to Indian subcontinent during winters.

Faiths, Customs and Beliefs

The Vedic literatures of Hinduism refer River Ganga as 'Sursari' or 'The River of the Gods'. Ganga is the symbol of purity in the religion and reflects the divinity and feminine energies in the mythology. Ganga is symbolized as one of the prominent deities in Hiduism. Some

ancient literatures refer her as the daughter of the Himalayas wedded to lord Shiva and became an adornment on his forehead. She is referred as the divine knowledge, truth, and purity that trickles down from Shiva's locks which flows into all the three worlds and that is why Ganga is also known as *Tripath Gamini*(way to all the three worlds).



The qualities of Ganga water are: Coolness, Sweetness, Transparency, High Tonic properties, wholesomeness, portability, ability to remove evils, ability to resuscitate from swoon caused by dehydration, digestive property and ability to retain wisdom.

The water of the Ganga is believed to contain minerals and herbs and does not contaminate for several days. A bath in the holy water of the river is believed to wash away all the sins. At the town of Gangotri River Bhagirathi turns towards North, and thus the name of the town is Gang-uttri (Gangotri) or the Ganga moving towards north *(Uttar*). The river is also known as Bhagirahi as it is believed that king bhagirath prayed to river goddess here at gangotri and persuaded her to descend to earth from heaven. The stone slab on which Bhagirath is said to have prayed to the goddess still stands on the banks of Bhagirathi river at Gangotri and is known as Bhagirath Shila.

Ganga is believed to be a celestial river, a goddess that flowed out of lord Vishnu's toe and flowed in heaven. It is believed that it was her descent to earth that brought prosperity and life on earth. The legend of her descend to earth begins with King Sagara, an ancestor of Lord Rama, who had become so powerful that even gods feared him. Like all powerful kings in those times King Sagara also decided to perform an Ashwamedh Yajna, in which a horse is sacrificed after is is sent off to wander at different places, wherever the horse wandered that place became the part of the kingdom.

Lord Indra , the king of the gods, feared the growing power of sagara and stole the horse and hid it in the hermitage of sage Kapil. Finding the horse missing, Sagara send off his sixty thousand sons to search for it. The sons discovered the horse in the hermitage of Sage Kapil, believing that the Sage had stolen it, and insulted him. Angered on being disturbed from meditation and false accusations, Sage Kapil burned all sixty thousand sons of Sagara, and turned them into ashes. Now the only way out to get his sons salvation was to get the ashes washed away from the holy water of the celestial river Ganga. He and later his descendents prayed to river goddess, but the ganga was reluctant to come down to earth. Finally the great

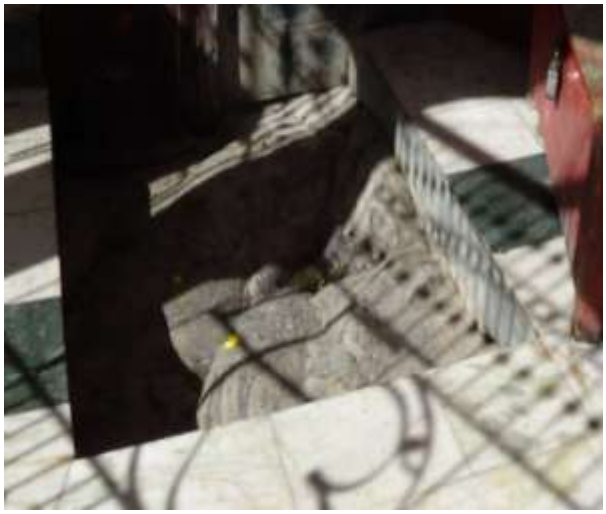
grand-son of Sagara, Bhagirath went to Himalayas and with his severe austerities he convince goddess ganga to descent to earth.

River Ganga turned the path of her waters towards the earth but the power and force of the river were so strong that Lord Brahma feared that the tumultuous flows of the river would wash away all the creations on earth. Bhagirath finally prayed to lord Shiva for help, who laid and captured ganga in his long matted hair, to break her forces. As the river meandered in the matted hair of the lord it lost its violent force and descended gently on earth, bestowing life and salvation all along its course. Bathing in the river is thus considered to bestow salvation to humans. Bathing in all the seven head water streams of Ganga is known as Sapta Samudri Tirtha.

View Of Gauri Kund

Gangotri Temple

Bhagirath Temple At Gangotri



Bhagirath Shila At Gangotri

One Of The Many Peaceful Ashrams At Gangotri

Devotees Performing Rituals On Banks Of The River

Mukhwa Village Near Dharali

Interiors Of Pandava Cave

The temple of Gangotri celebrates the appearance of Ganga on earth. The temple is made of Granite and was built by Ghurka general of Nepal Amar Singh Thapa in the 18th Century and was later renovated by King of Jaipur. The temple contains Marbel and silver idols of goddess Ganga in the Garbha Griha. The temple is closed down in winters after Diwali and the puja is continued in the Mukhwa Village near Dharali. The temple again reopens on the day of Akshaya Tritiya every year. A cave known as Pandava Cave also lies 1 km away from Gangotri and is said to be dwelled by Pandavas during their trip to heaven.

It is also believed that goddess Parvati bathed at Gauri kund and the waters from downstream of this place is not offered to lord Shiva at Ramanathaswamy at Rameshwaram.

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