

## **Investigation of Garhs / Hill forts (fortress) using Geo-Informatics Tools in District Pauri of Garhwal Himalaya**

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**Abstract:** *One of the most redeeming archaeological feature in Garhwal Himalaya is the ruins of a well laid out regular stone structure of large buildings or fortresses located on the highest cliff of the mountain locally known as Garhs belonging to late medieval. It is owing to the presence of such structures of Garh, this region, which was earlier known as Kedarkhnad in ancient times (Dabral, 1961), was christened as Garhwal from 15th century onward. Chatak, 1990; Naithani, 2006 Dhasmana(1995). Though some preliminary studies have been done by various workers to provide insight into the architecture and history of these Garhs, however no serious investigations has been done to locate them in the region and study these structures in historical perspective. Though the well known Chandpur Garh was excavated by archaeological Survey of India in 2004 to know its antiquity (report unpublished). However, these late medieval structures have largely rather remained a subject of curiosity and not worth of any academic study, and hence have not attracted the attention of to the scholars and others till today. In view of this, I have taken up the study of Garhs in a Geo-historical perspective through multidisciplinary approach to understand the emergence of such structures during late medieval phase and their spatial distribution in the specific mountainous topography. However the present paper reports the preliminary results of the study to precisely find the location of the Garhs in Pauri district of Garhwal Himalaya through exhaustive field work, Remote Sensing and Google Earth.*

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### **I. Introduction and Problem**

The history of the Garhwal Himalaya after the decline of Katyuris around 12<sup>th</sup> century AD and the emergence of Pal dynasty in 16<sup>th</sup> century is very sketchy and not much is known of this period (Dabral, 1961; Katouch, 1996; Gairola, 1943; Rawat, 2002; Handa, 2002). According to Negi (2007) After Katyuries, the region of Garhwal was ruled by about 64 independent petty chieftains who frequently fought with each other. However, in the beginning of 16th century, Ajaypal, Chieftain of Chandpur Garhi unified the whole region of Garhwal. After Katyuri dynasty these Garhadhipatis played a vital role in history of Garhwal. It is believed that during this intervening phase these medieval structures were raised in the Garhwal Himalaya by the petty ruling feudal chiefs, but strangely enough no historical information is available about these feudal chiefs who independently ruled the fragmented territories of Garhwal. The only remnants of this phase are the ruins of their forts or *Garhs* which supposedly were strategically raised on the highest cliff as the military outpost to keep a watch over the invaders. Therefore besides this information, these structures have not only remained elusive but even the location of a large number of structures is still conjectural and uncertain in this region.

While investigating the *Garhs* based on these accounts, what is intriguing to note that the location of the *Garhs* indicated in the publication has not been clearly shown and incomplete to precisely reach to the site of these structures for further investigations? Therefore, to undertake the exploration of these late medieval structures, a new scientific methodology based on Survey of India maps, Remote Sensing and Goggle Earth has been used in locating the sites of *Garhs* in inaccessible areas in Garhwal Himalaya. Although archaeology poses a unique challenge to Remote Sensing due to various factors and constraints but scientist and archaeologist in recent years have been successful in detecting the buried structure or camouflaged features. With the help of these virtual investigation tools Vega (2011) discovered about 140 Hill forts in Central coast of Peru in South America. Further advances have been made by using LIDAR (Laser based remote Sensing Technology) to detect the buried archaeological structure (Chase et. al 2012). Recently in Indian context the spatial and non-spatial information retrieved from historical maps, paintings etc of stone fortress of Chitledoorg in Central Karnataka in India has been integrated and studied using the Geo-informatics and Virtual Reality tools to study the change in the landscape over a period of time (Nalin and Rajani, 2012). Therefore, in view of the importance of these *Garhs* in Garhwal Himalaya, this paper focus on the result of preliminary investigation using remote sensing data and field survey in district pauri Garhwal to trace the remains of *Garhs* in district Pauri garhwal.

## II. Review of work:

The published literature on this particular phase of Garhwal History is limited, Atkinson (1884) touched this topic 'as in the days of Ajay pal, Garhwal was divided in 52 small units each chief of these units were fully independent. Later on many authors put the only passing reference about these Garhs. Alam Singh Rana (1910), Walton (1927), Vaishnava(1927), Raturi (1928), Dabral (1976,77), Bahuguna (1995), Chauhan (1997), Handa (2002) refers about these Garhs as Baoni Garhi. It was Raturi (1928) in his book *Garhwal ka itihās* gave the list of 52 *Garhs*. According to Raturi (1928) these Garhs were initially strong hold of Khasias. Later on this were captured by adventurer Aryan warrior properly known as Thakurs. Negi (1988) provides the list of 64 *Garhs*, Katouch (1996) gave lists of more than hundred *Garhs*, and secondly some other individual enthusiastic published their paper about *Garhs* in journals and local magazines. In this context a reference may be made of a special volume of a regional magazine 'APARAJITA' in 2008 which was fully devoted on the *Garhs* of Garhwal Himalaya. It provided some basic information on the types and location of Garh in Garhwal Himalaya. Excepting this work, there is no detailed work on these late mediaeval structures in historical perspective. It is quite possible that due to the inaccessibility in the rough terrain of the mountains, a large number of historical structures or *Garhs* have not been investigated or explored by workers and hence these structures have been left in oblivion.

### Study Area

In order to find the location of the Garhs, a new strategy and method based on Geo-informatics tools of GPS, GIS and Remote Sensing, Google earth and field survey as indicated above has been used in the present study of the Pauri district of Garhwal (29045' to 30015' Latitude and 78024' to 79023' Longitude), falling in the North West flank of Uttarakhand encompasses an area of 52302 km. In the present study two well know Garh of Chaundkot garh and Chhetra garh in Block Pokhra have been taken for detailed study. This district is surrounded by the districts of Chamoli, Rudraprayag and Tehri Garhwal in North, Bijnor & Udhamasingh Nagar in South, Almora Nainital in East and Dehradun and Haridwar in West (Figure 1).

## III. Methodology

Ancillary information on the location of Garhs was collected from different books and published literature. Locations of Garhs are identified by using SOI Toposheets (1:50,000) and traced by using high resolution satellite data (Quick bird and IKONOS). Vector (Point) layer of traced locations is prepared by using ERDAS IMAGINE 2011 software. IRS 1C LISS III satellite data is georeferenced using 16 Ground Control Points extracted from toposheets. It is used for making location map of different Garhs in the area. For understanding the rugged topography of the area, Slope (Figure: 2), Contours (Figure: 3) and Elevation zones map (Figure: 4) are prepared with the help of ASTER derived DEM (Figure: 5) using ESRI ArcGIS 10.1 software. Chaundkot Garh in Block Pokhra of Pauri district is marked using LISS III satellite data using different band combination (Figure:6) for enhanced identification of the Garh.

Finally the field survey of two important Garhs (1-**Chaundkot Garh** and 2- **Chhetra Garh**) has been done to study the ruins and the environmental background and to discern its architecture. It is Important to point out that Chaundkot Garh is mentioned in all three list of Garhs given by various workers but Chhetra Garh is not include in any of list. So for confirmation these two Garhs were surveyed with GPS (Global Positioning System) to mark its location.

**Chaundkot Garh** (29°58'42.02"N 78°54'04.31"E) situated in near village Dantha, Patti Kimgidi Gad, Block Pokhra, near to Chaubattakhal, and **Chhetra Garh** (29°53'05.29"N 78°53'00.76"E) is situated near village Bansai, Patti Talai, Block Pokhra. The nearest station is KunajKhal in District Pauri Garhwal.

## IV. Results:

In the present study of the medieval structures of *Garh* shown in the three list as given by different scholars have been examined to check their location in the toposheet and find their signatures on the satellite imageries as mentioned above. Since the names of some Garhs in the three different list differ with each other giving different locations for similar *Garhs* and therefore, it is difficult to find a uniform number of such structures in the map. The study has revealed that there are some new location of *Garhs* which have been identified which does not find reference in any of the three list provided by the scholars. Secondly it is very important to highlight that the structures of square rooms with stone walls and surrounding ditches of Chhetra Garh which have been found buried and covered under dense bushes or forest cover over a large area does not show any signature on Google earth imageries but only some topographical features are discernable (figure: 7). In view of this it has been decided to make use of some high resolution satellite imageries or LIDAR (Laser based remote sensing technology) to develop this work further so that the structural remains buried under the thick vegetation or forest cover could be delineated through LIDAR.

After visiting the site of Chhetragarh a large number of square structures made of stone or rock slabs have been found. On detailed examination of the structures it was estimated that there could be about more than 100 rooms which are clearly visible on one flank of top of the hill. Each room is almost square in shape measuring about 3m long and 3m wide (figure: 8). The other portion of the *Garh* is totally buried.(figure: 9). The peripheral main area of the *Garh* has been found surrounded with some unplanned stone wall running over the top of the cliff of two hills. The security of the *Garh* was further reinforced with 5 manmade ditches running between each two hill tops.

In second case the satellite imageries of fortified area of Chaundkot garh is very clear and the remnants of architectural pattern of the stone structure are found on the two hill top (which has been named as hill top -1 and 2) with many ditches around it (figure: 10). On the basis of this result it may be said that the hill top 1 was the place of chieftain or Nobel class (figure: 11) and the hill top 2 must have been a residential area for army (figure: 12). The total numbers of rooms at Chaundkot *Garh* could be more than 200. The remains of major rooms are also visible on the imagery which were seen also during the field survey (figure: 13) and there are 14 deep manmade ditches between these two hill tops, (figure: 14) two another manmade ditches are southern side of hill top 1.

It is important to notice that these *Garhs* were highly protected as it were protected through natural ditches on one side and or through made ditches from two sides (figure: 15), and from another side the river or revaluate gives protection to it. The location of *Garhs* on the top of the hills or cliff overlooking the valley does show that they were made purely as warfare strategy to protect from the invaders but it will not be correct to assume these were purely the outpost however these were also raised for residential complex for the Chieftains as well as for their army and such represented the centre of power of the noble class who ruled in a particular area.

## V. Conclusion:

With respect to prospecting for fortifications in this whole region, this case study demonstrates the feasibility, in terms of time and logistical-efficiency of using fine spatial resolution imagery that is freely available for viewing in Google Earth. It is possible to identify more locations using satellite imagery in Google Earth. This paper gives a detail account of *Garh* of Pauri Garhwal, however it is must be noted that the maximum number of medieval *Garhs* mentioned in list 1 are located in district pauri with very large topographical differences (from 609 meters to 2120 meters). Based on the result it has been possible to identify 14 main *Garhs*(list:1) referred in the published work, 7 new location of *Garhs* (list: 2) were identified while about 15 possible new location(list: 3) have been identified. The present preliminary scientific study of *Garhs/Hill fortress* of Uttarakhanad Himalaya does open a new avenue for the application of Geo-informatics technique in History and Archaeology.

## Acknowledgement

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S.N.	Name of Garh	Coordinates Latitude , Longitude	Elevation in Mtrs.	Nearest Settlement
1.	Ban Garh	29°46'57.73" N 78° 56'55.13"E	1670	Bangarh Village
2.	ChaundKot Garh	29°58'42.02"N 78°54'04.31"E	2052	Dantha Village
3.	Deval Garh	30°13'13.90"N 78°51'36.80"E	1041	Bughani Village
4.	Dhangu Garh	30° 04'02.39"N 78°29'43.02"E	609	Kaudiyala
5.	Garhkot Garh	29°53'12.02"N 78°42'18.01"E	881	Satpuli
6.	Kanda Garh	30°11'57.16"N 78°41'51.59"E	1410	Dehalchauri
7.	Kolli Garh	29°49'28.69"N 78°52'52.27"E	1519	Kalwari village

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8.	Langoor Garh	29°55'08.85"N 78°39'21.88"E	1857	Gumkhal
9.	Lod Garh	29°51'46.01"N 79° 00'14.04"E	1819	Shaitul Khal
10.	Mahab Garh	29°52'40.74"N 78°27'18.62"E	1642	Hathi Mattha
11.	Nayal Garh	30 11 06.40 N 78 48 39.25 E	913	Nayal Village
12.	Rani Garh	30° 04'04.36"N 78°42'50.29"E	2120	Kanskhet
13.	Sabli Garh	29°54'33.27"N 79° 01'03.44"E	1681	Nandakhet
14.	Ulka Garh	30° 09'33.78"N 78°50'53.92"E	2064	Khirsu

List-1: Identified Garhs from list of Main (52) Garhs

S.N.	Name of Garh	Coordinates Latitude , Longitude	Elevation in Mtrs.	Nearest Settlement
1.	Chhetra Garh	29°53'05.29"N 78°53'00.76"E	2005	Bansai Village
2.	Gahad Garh	30°13'10.46"N 78°49'56.69"E	918	Gahad Village
3.	Ghugti Garh	29°57'00.26"N 78°20'25.26"E	1311	Kasani Village
4.	Gurad Garh	29°56'25.03"N 78°50'18.15"E	1370	Gurad Talla Village
5.	Khaira Garh	29 36 37.02 N 78 43 19.04 E	874	Kala Garh
6.	Rajja Garhi	29°49'59.35"N 78°47'15.83"E	1934	Taadkeshwer
7.	Thandar Garh	30° 3'48.39"N 78°53'38.25"E	1230	Markhola Village

List-2: Identified Garhs From list of other mentioned Garh

S.N.	Name of Garh	Coordinates Latitude , Longitude	Elevation in Mtrs.	Nearest Settlement
1.	Dobar Garh	29 46 41.53 N 78 49 12.78 E	1714	Sandhan dhar
2.	Bairagarh	30 03 55.72 N 78 22 30.59 E	444	Gyuntha
3.	Bandargarh	29 38 26.49 N 78 35 41.61 E	761	Gujarvali Sot
4.	Bhagmal garh	29 53 45.40 N 78 22 07.26 E	1036	Gardkot
5.	Buragarh	29 41 00.62 N 78 57 44.60 E	1310	Chaibara
6.	Chilgarh	30 13 22.82 N 78 41 39.06 E	624	Kandi
7.	Garh	30 13 01.73 N 78 50 06.52 E	890	Basoli
8.	Ghindiyal garh	30 13 44.25 N 78 58 55.98 E	2091	Chipalghat
9.	Jamangarh	29 44 55.00 N 78 32 50.69 E	824	Grastinganj
10.	Jaspal garh	29 52 59.67 N 78 25 01.15 E	1043	Jaurasi malla
11.	Julamgarh	29 41 07.06 N 78 54 45.59 E	1173	Dala

12.	Maba garh	29 52 40.18 N 78 27 26.08 E	1630	Amaldar ka gaun
13.	Nayangarh	30 08 35.25 N 78 56 08.91 E	1692	Chaluni
14.	Raja Garh	29 40 09.99 N 78 58 55.01 E	1232	Baniagaon
15.	Ranagarh	30 03 18.69 N 78 29 04.95 E	599	Jhair bada

List-3: Name of Villages with title of Garh



Figure: 1



Figure: 2 - Slope map of District Pauri Garhwal

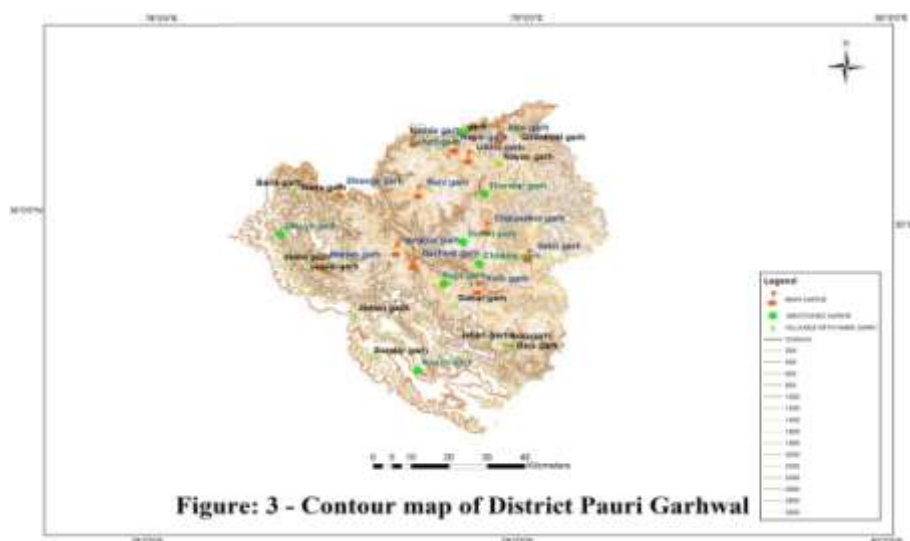
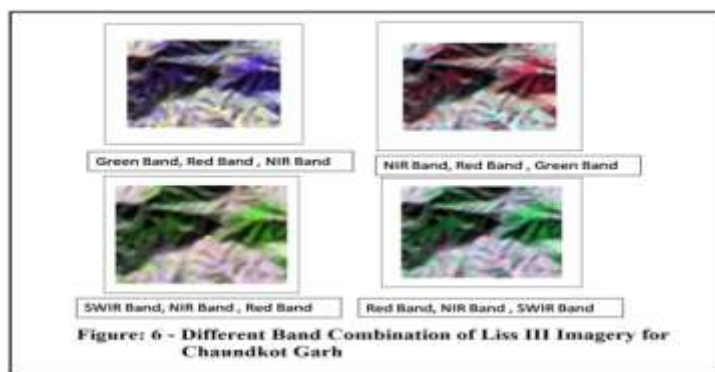
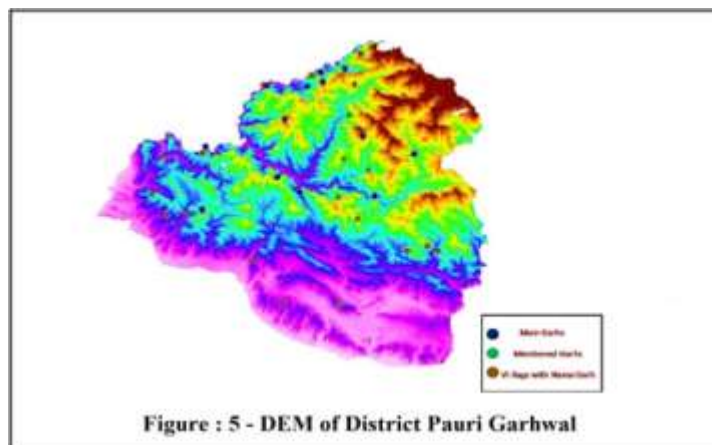
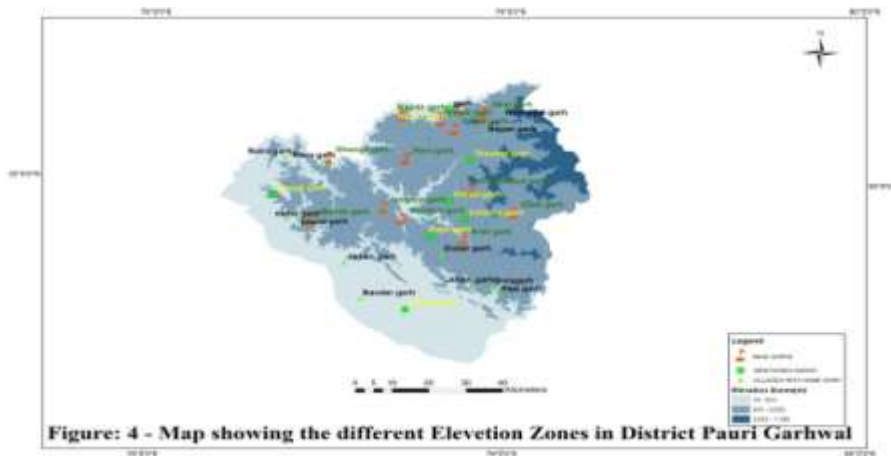
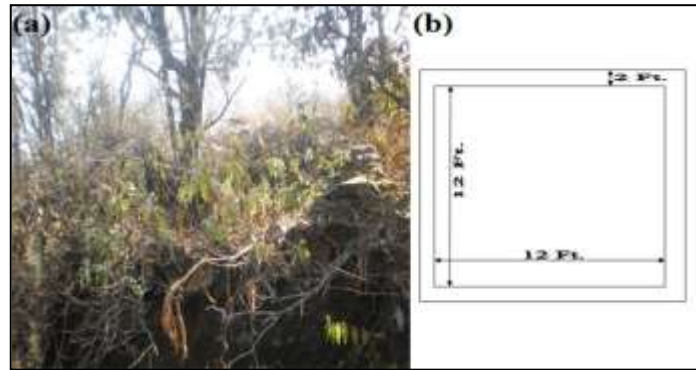


Figure: 3 - Contour map of District Pauri Garhwal

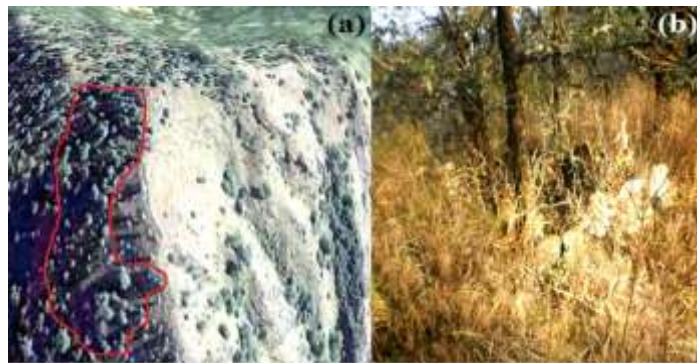




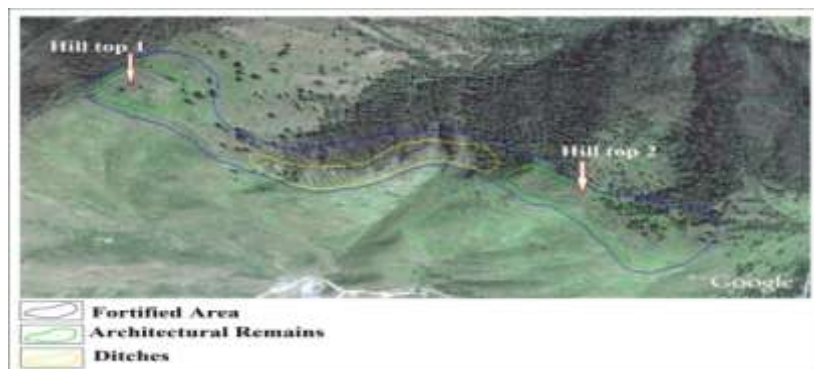
**Figure: 7- View of Chhetra garh**



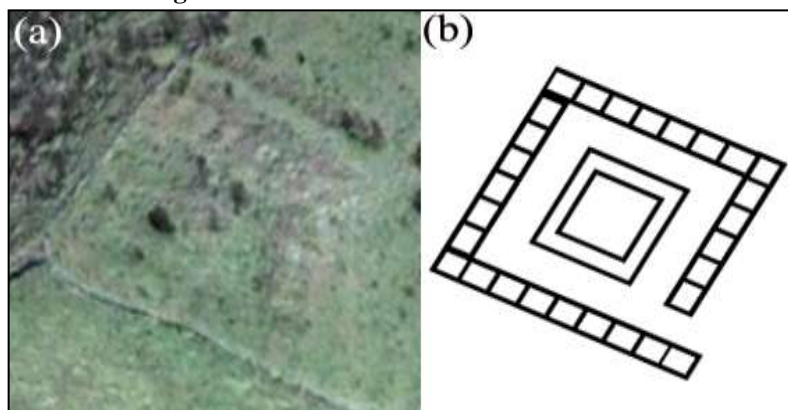
**Figure : 8** (a) Ruminants of rooms at Chhetra Garh  
(b) Measurement of rooms of Chhetra garh



**Figure : 9-**(a)Google earth image of Chhetra Garh showing the covered area of site.  
(b)Photograph of a wall in covered area of Chhetra Garh.

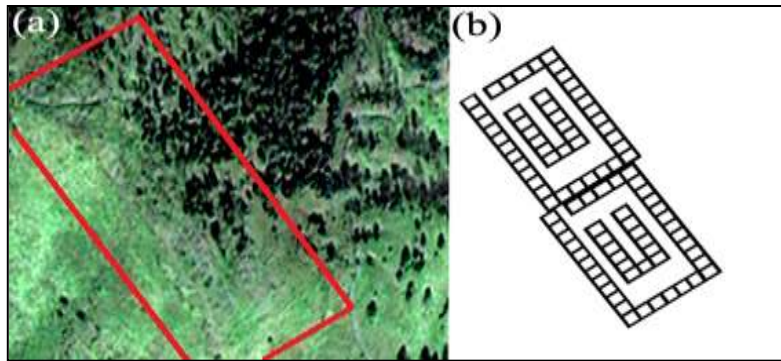


**Figure : 10-** Satellite view of ChaundKot Garh



**Figure : 11-** (a) Satellite view of ruminants of rooms on hilltop 1.  
(b) Probable sketch of pattern of rooms on hilltop 1.

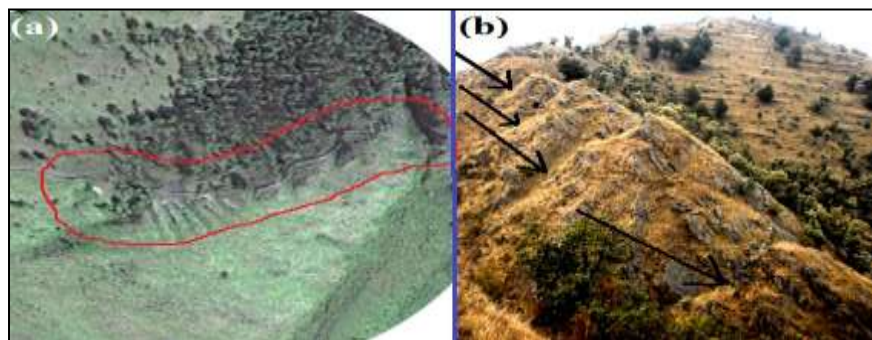




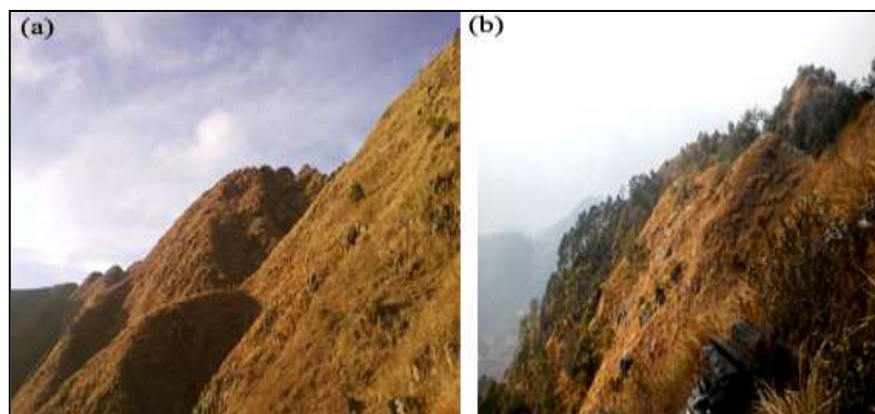
**Figure : 12-** (a)- view of ruminants of rooms on hilltop 2.  
(b)- Probable sketch of pattern of rooms on hilltop 2.



**Figure : 13** – Photographs of ruminants of rooms at Chaundkot Garh



**Figure : 14** (a) - signatures of ditches on Google Earth imagery  
(b)- Field photograph of Ditches at Chaundkot Garh



**Figure: 15** (a) View of Natural ditch at Chaundkot Garh  
(b) View of natural ditch at Chhetra Garh



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