Chapter 5

Case Studies

Lonar : A Supernova Creation

Chikhaldara-Melghat : A Hill Station in Hiding
LONAR CRATER: A SUPERNOVA CREATION

Introduction
The district Buldhana, Maharashtra State, India provides geological interest for unique occurrence of picturesque Lonar crater, the only such in the great basaltic province of India. The remarkable shape, size and uniqueness of crater lake at crater basin being saline has attracted the attention of geologist, ecologists, archaeologists, naturalists and astronomers and has been the subject of several studies on various aspects of crater ecosystem. This inland lake with no effluent is fed by a seasonal drainage mainly confined to it’s periphery and also by number of fresh water springs. Maximum depth of brine is 5.50 meters. It is one of the prospective ‘Ramsar Site’ in India. Far from being a sterile wonder it harbours an oasis of life within it’s womb.

Lonar is one of the strangest, loveliest and least known places in India. Geographically located at Latitude: N19° 58' Longitude: E76° 31', it is about 170 kms from the town of Aurangabad, which is the famous jumping-off spot for the World Heritage Sites of Ajanta and Ellora. But Lonar is, if that is
possible, at least as interesting as these famous temple sites. In some ways it is more so, because the central feature of Lonar is a massive crater lake formed by a meteorite impact over 50,000 years ago! Scientists concur that this crater was formed 40,000 to 50,000 years ago when a meteorite strayed from its celestial path, entered the earth's atmosphere and crashed near here thus carving out a bowl roughly 1.8 kilometre in diameter. Scientists speculate that 600m below the southeast rim lie pieces of this meteorite. The size and age of Lonar make it the largest and oldest meteoric crater in the world, antedating its nearest rival, the Canyon-Diabolo of Arizona in the United States by a clear 2.30 centuries. The Lonar Crater is yet to be a large tourist attraction as is the Barringer crater in Arizona, USA even though it is situated 553km from Mumbai and about 4 1/2 hours southeast of the famous Ajanta Caves.

A Meteor falling onto the surface of the earth with an impact so intense that it creates a huge crater (depression) on the surface of the earth much like those found on the moon! Well, that is what happened at Lonar, nearly half a million years ago. A meteor of 60 meters long and weighing 20 lac tons was racing at a speed of 25 km per second towards the planet. The impact was so severe that it left a massive crater 170 meter deep and with 1800 meter diameter. Eventually, a shallow saline lake formed at the bottom of this crater. A crater is formed when two objects collide at high velocity. The smaller colliding object is usually destroyed by the impact and a crater is created on the larger object. During the impact, target material is ejected out of the crater forming ejecta. Ejecta then contains vaporized, molten material, some from the impactor but mostly from the target, which is
now solidified and settled around the crater rim. When an impactor hits the target tremendous amount of energy is released in the form of heat and pressure. This melts and shatters the surface of the target at impact site.

It is the only lake in the world formed by meteorite impact in basaltic rock. Uniqueness of the lake is it’s salinity and alkalinity. Salinity of lake has been decreased from 300 ppt in 1958 to mere 100 ppt today. pH of the lake water is 10.5. Thus lake water is highly alkaline. The crater contains many sub-ecosystems, each constituting a subtle combination of floral and faunal species, due to localized variations in the conditions of soil, water and humidity. The Lonar ecosystem has evolved in a unique way due to the unusual geohydrological and climatic conditions. However, the same conditions have made it extremely fragile and vulnerable to human interventions. Therefore, the biotic zones resulting from such isolation, need immediate protection. There is a general consensus that the Lonar crater should be given a special status in order to protect and conserve it as a natural and culture heritage of extraordinary significance.

Two things are rather unusual about Lonar Crater. They are –

1. The waters are a unique, shifting combination of azure and turquoise and parrot green when seen from the viewpoint. This has something to do with the fact that the meteorite is still dissolving itself into the water. The lake has two distinct regions that never mix - an outer neutral (pH7) and an inner alkaline (pH11) each with its own flora and fauna. You can actually do a litmus paper test here and check this for yourself.

2. There is a perennial stream feeding the lake with sweet water but there seems to be no apparent outlet for the lake's water. And it is also a big unsolved mystery where the water for the perennial stream comes from, in a relatively dry region like Buldhana. Even during the height
of the summer months of May and June, the stream is perpetually flowing.

**Geo-Morphology of Lonar Crater**

The crater is formed in the basalt rock of thickness 600-700m. This rock is made of many layers or flows, which were laid why volcanic activity at various times. Five of such flows are exposed at the crater rim. Thickness of these flows ranges from 5 to 30m. The crater is about 170m deep and has average diameter of 1800m. The elevated rim consists of 25m of bedrock and 5m of ejecta over it. This ejecta blanket is spread over about 1350m away from the crater rim and slopes away by 2-6°. The uppermost region of ejecta contains the deposits that were melted due to the impact. Ejecta of any crater is an important factor. The way in which ejecta is spread tells about angle of impact. Spreading pattern for ejecta talks about degree of fluidisation of the rock, volatile components of the rock. This pattern also depends on the planet gravity and presence or absence of atmosphere. Thus if we know how these parameters effect spreading of ejecta then we can conclude about the conditions of impact on that particular planet. And the best place to know these parameters is our earth itself. However, hardly a few craters on the earth are studied well with reference to this point. Lonar crater has surprisingly well-preserved ejecta. Thus this ejecta should be studied further and then it should be conserved also. Crater floor is almost flat & harbours a shallow saline lake.
According to discernible geological features the Lonar crater has five clearly
distinguishable zones, exhibiting distinct geomorphic characteristics and
hence require different conservation measures. These zones include:

1. The outermost Ejecta Blanket
2. The crater rim
3. The slopes of the crater
4. The crater basin, excluding lake
5. The crater lake

The unusual presence of Lonar crater amidst the vast monotonous plateau
surrounding it from all sides has caused localised transition in the important
geographical, geological, climatic and thereby ecological parameters. Being a
subterranean, hollow confined and closed from all sides:

1. It is protected from heavy wind blowing.
2. It retains higher humidity levels.
3. It forms a localised temperature system
4. It gets partly screened from direct sunlight at different places and different
times of the day, throughout the year.
5. It serves as a percolation basin.
6. It offers unusually peculiar geomorphologic features.

**Discovery - Background**

Lonar crater is an important geological structure. This crater formed in basalt
rock of the Deccan plateau some 35 to 50 thousand years is only of its kind.
Though now it is declared as an impact crater. But from 1823 when J. E.
Alexander pointed out the crater, for almost a century and half the exact type
of its origin was a debatable issue. Initially it was thought to be a volcanic
crater. In fact the famous geologist G.K. Gilbert in 1896 showed its similarity
with the Meteor crater (Barringer crater), Arizona.
Though the Lonar crater does not have an adventurous scientific battle associated with it like the Arizona crater, the crater itself is an interesting one and has been doubted as a volcanic crater for most of the nineteenth and half of the twentieth century. In 1896 the scientific patriarch G.K. Gilbert pointed out its similarity with the Meteor crater but he rejected the impact origin of these craters. There were a few studies after but none suggested an impact origin. In 1952 C.A.Cotton in his monographic work entitled as 'Volcanoes as landscaped forms' doubted volcanic origin because of lack of recent volcanic process in Indian sub-continent and thus preferred meteoritic origin for Lonar crater. So a debate started: is Lonar crater an astrobleme or a geobleme?

Astrobleme is a scar on Earth created by a non-terrestrial entity while geobleme is a geological structure formed by the terrestrial process on the Earth itself. In 1961 N.C. Nandy and V.B. Deo made a thorough survey of the crater site. They suggested that a crypto-volcanic explosion must be responsible for crater-formation. Usually volcanic explosions are associated with extrusion of lava i.e. the molten interior of the Earth and also with the presence of pyroclastic material. On rare occasions there can be a violent explosion caused by steam accumulated under the ground without effusion of lava or formation of pyroclastic material. Since these two indicators were absent from the Lonar site crypto-volcanic process was suggested for its origin. Also the crater is situated on the Deccan plateau which is famous for its volcanic origin. Thus one might at first relate similar process for the crater. Nandy and Deo also suggested that the crater be formed shortly after the Cretaceous period i.e. 60 million years ago.
In 1964 Eugene C. Lafond conducted a field survey at Lonar and along with Robert S. Dietz suggested that the crater must have been an impact crater and originated some 50 thousand years ago. What was the basis for this suggestion? First of all they found that the crater is highly circular in diameter and has a characteristic depth-to-diameter ratio of an impact crater. The crater has a raised rim, about 20 m above the surrounding. This was another factor pointing towards the impact origin. The surrounding rock dips away from the crater edge at inclinations of 14-27 degrees, one more feature of impact craters. Along with such morphological parameters shock metamorphosis in the rock also tell how the crater is formed. To look at the rocks drilling into the crater was done. In the drilling done by Nandy and Deo breccia was found. Breccia is another feature of shocked rocks found in impact craters. Thus all these factors were pointing towards impact origin of Lonar crater. Lafond and Dietz also looked at the erosion of the crater site. Longer a site exposed to eroding entities such as wind, water, and temperature more it erodes or degrades and exposes underlying layers of soil. A geologist can look at these features and estimate age of the site. Lonar crater has been exposed to the eroding entities. It has a fresh water stream running in that erodes the walls, puts sediments onto the crater floor. Based on the erosion study and sediment accumulated in the crater Lafond and Dietz suggested that crater to be quite young. And it must be formed some 50 thousand years ago or at the most in late Pliocene i.e. 1.8 million years ago. The idea of impact origin then became even stronger when V.K. Nayak of Centre for Advanced Study in Geology, University of Saugar, Madhya Pradesh, India found glassy objects at the crater site. He found glassy objects varying from 1mm to 5 cm that can be formed by melting and fusion of rock during an impact. In the drilled out material he
found breccia with shocked features, broken and twisted plagioclase. feldspars, strongly oxidised basalt. All these are the features of shock metamorphosis associated with the rock that receives an hypervelocity impact.

In 1973 based on the work done by K. Fredriksson of Smithsonian Institute, Washington DC, D.J. Milton of US Geological Survey, California in collaboration with A. Dube and MS Balasundaram of Geological Survey of India impact origin of Lonar crater was established. They discovered breccia with shatter cones and material containing maskelynite. Maskelynite formation requires very high pressure almost 4 lakh times the average atmospheric pressure on the Earth. And this is created only during hypervelocity impact. No volcanic process can form maskelynite. Thus impact origin of Lonar crater was proved. Three other researchers, D.Lal, D. MacDougall, and L. Wilkeing, estimated the age of the crater to be less than 50 thousand years using a fission-track dating method. Then, in 1996, based on properties of impact glasses found at the crater site D. Sengupta estimated age of Lonar crater to be about 52,000 years. Further more Fredriksson et al found that geological material of Lonar crater is very similar to the samples of rock brought from impact basins created on basalt surface of the Moon. This factor and uniqueness of Lonar crater being the only impact crater on the Earth in basalt rock make it an important structure for study of craters in the solar system. This is the prime reason for conserving the crater, which seem to have been neglected by our community in spite of the unique features of the crater.

**Historical Importance**

There are numerous historical references over the centuries in various documents, which prove the importance of Lonar. The social, economic and religious references are found only after the twelfth century. This entire region was a part of Ashoka’s empire and later passed under the Satavahana rule. It was also a part of the Chalukya and Rashtrakuta Empires.
Besides being famous as a religious centre it was also an important trade centre, during the rule of the Moghuls, Yadavas, Nizam and the British.

Information, though limited, is found in the literature of the Mahanubhava sect, as well as in the ‘Aine-Akbari’ chronicles. In medieval times, this town was reputed for its glass, soap and salt. The Ain-e-Akbari mentions that the raw materials required to make glass were richly available here. Emperor Akbar is said to have had a fondness for soap from Lonar. And in his days a salt factory was located here.

Shah Jehan was the next king to visit Lonar as well as Nana Saheb Peshwa. Peshwa Raja Chandumal, the minister of the Nizam of Hyderabad, realized the religious importance of the place and presented ‘Motha Maruti’ (the Big Hanuman) to the religious trust.

1853 onwards Lonar came under British rule. Colonel Mackenzie made a systematic and detailed study of the crater. In his opinion, the black coloured chemical liquid had been seeping out for several years from the mile long strip of land to the south of the lake which forms into a sort of slush during the monsoons. He submitted his report to the Government and although today, his theory is invalid, it remains even so important as a ground-breaking attempt to study the region.

**Temples at Lonar Lake**

Lonar Lake is surrounded by many temples, about 14 temples are situated within the slope of Lonar. The oldest temple is some 1300 yrs old and many of them have fallen before. These temples are built by different kings of different religions. A temples has sculpture which tells about the formation of Lonar. A demon named Lavanasur had caused trouble on earth, earth requested Lord Vishnu to kill the demon. Lord said that while killing the
demon he might destroy the earth. So he takes the form of a child and kills the demon. The demon goes deep into earth and dies. The name of the demon Lavanasur in Sanskrit language means 'salt?'. A hole was formed where later on lake was formed. This salty lake came to be known as Lonar (or Lavanar - Demon Lavanasur). During Holy Festivals people come in number of thousands to visit a temple where rituals take place. The temple is about 20-25 Mts. away from the Lonar Lake, people coming here throw plastic wastes and food stuffs near to the temple. Many people take bath in Lonar Lake polluting the lake. Many skin diseases are cured by this water. Other temples, which are now in forests, have been occupied by animals and bats.

The temples at Lonar are known as Yadav Temples and also known as Hemadpanti Temples named after Hemadri, who was a military general of the Yadav period. There are altogether thirty-two temples, seventeen monuments, thirteen kundas/lakes and four inscriptions at Lonar. Of these, twenty-seven temples, three monuments, seven kundas/lakes and three inscriptions are located outside the crater. The all belong to the Yadava and the medieval periods. These eight hundred year old temples have been the subject of serious study during the 20th century. Henry Cousins, A.V. Naik, O.P. Verma, G.B. Deghrulkar, Brahmananda Deshpande, Prakash Vyal, Morwanjikar and other scholars have greatly contributed to our knowledge about these temples. The architectural plan and intricate decorations of the Daityadudana temple in Lonar town has been the centre of attraction. The temples near the lake are equally impressive even though they lie in decay and ruin and are now permanent abodes of bats and mice, their beauty and majesty cannot be ignored. Also many of the idols have long since been stolen. Only the ones that attract pilgrims have some resemblance to their original selves.
**Temples Located Inside The Crater**

**Ramgaya**

It is said that Lord Rama visited this place, hence the curious name given to the temple. This group of temples has three elements, namely a. Lord Ram’s temple, b. Lord Shiva’s temple, c. a pond known as “Barav”. Besides a wooden statue of Rama, there are some recesses in the interior containing statues of secondary Gods. There are three entrances and on one of the door frames the word Vasuji is carved, he was probably the head mason of this temple.

A small structure of Hanuman lies in the front of the main entrance. Lord Shiva’s temple has three elements of a typical Indian temple, namely, garbh-griha, antrala and mandapa. A unique Sivalinga is placed here. Nandi-shrine is not placed on the east-side as in a typical Shiva temple.

The “Barav” also known as Rama Kunda Barav is a rectangular pond which had a natural water source but, due to some reasons, the direction of water has changed. This pond was used for ablutions before entering the temple.

Regarding the orientation, as stated before, most of the temples face towards the lake, so this temple also, unlike a typical Indian temple, does not face the east but is oriented westwards.

**Vishnumandir**

The Vishnu temple is located near the lake. The construction is similar to the Ramgaya temple. Some of the stones and pillars are well preserved. It is believed that Rama had visited this place and performed ‘Tarpan’ (a ritual held for the dead) of his father Dashratha. The temple hosts a Shiva and a Ganesha Idol. The entrance of the inner chamber has beautiful carvings of lions.
Wagh Mahadeva
Further along the the way from the Ramgaya temple is this east-facing temple. You can enter this bat infested temple from the north side. You will find a carved pillar depicting a fight between a lion and an elephant. This was the insignia of the Hoysala kings which suggests that the Hoysala kings contributed to the erection of this temple. As one steps out of the door on the left, one sees another pillar with an outstanding sculpture of a Naga princess (naga kanya).

Mora Mahadeva/Munglyacha Mandir
Literally the temple of ants the outer sides of this temple are extremely crude. It contains neither a Sivalinga nor a Shiva idol. The sculpture of the Naga princess is exquisite.

Goddess Kamalaja Devi
The most important and most frequented of the temples on the crater rim, this temple faces south. This was the meditation place of Chakradhar Swami. References are found which state that he did penance in the Bhairav temple next to the Kamalaja Devi temple. Due to the constant flow of devotees, specially during the Navratri festival this temple is fairly well preserved and painted at regular intervals. The deepa mala or the pillar of lamps has a heart shaped or peepul leaf shaped yoni kunda at its base. Instead of an idol of the Goddess, there is a tandala. Several temples are located here including the Devi temple, a large structure with a stone plinth that stands amongst the trees at the edge of the lake. Along the rim of the crater is present the Gomukh Temple, which is where the perennial stream emerges and pilgrims visiting the temple, bathe in the stream.
Flora – Fauna

The Lonar crater and lake form not only a spectacular sight but over the centuries they have evolved an ecosystem that is not replicated anywhere else in the state. For, the crater is host to many species of aquatic birds like flamingos, moorhen, coots, and dabchick and so on. Peacocks are to be seen making spectacular glides from tree to tree. Unlike the rest of the country they do not even need to forage upon the ground; so plentiful is the insect and small prey population in the vegetation. The trees that grow in this region are rather tall and they form a canopy that filters out most of the heat. It does tend to get a bit muggy with the unusual levels of humidity. You can even see dung beetles the size of your palm busily rolling their balls, right in your path. There is no danger of snakes but geckos abound. One feature that has a potential to be a nuisance is the monkey population. They are immensely territorial and throw fruits and twigs at your heads if you have ventured near the trees they stake out. If this is close to running water, as the crater has many little streams with cold water, they become agitated. It is also not a good idea to openly display food as they will learn soon enough that tourists are easy prey.

The predominant vegetation of Buldhana District is dry deciduous forest. The climatic conditions, coupled with the limitations of soil and groundwater, have greatly restricted the quality and expanse of vegetation over large parts of the district.

The flora of the plateau, hillocks, slopes and river basins around Lonar crater may be considered as broadly representing the general floristic pattern common throughout the Marathwada and western Vidarbha region.

As one begins to climb down the steep slope of the crater, one realises that except for a few bushes and trees the area is quite bare compared to the thick jungle below. The few trees that are seen here are Babul (Gum Arabic, Acacia
family). The forest in crater is remarkably different from the scrubby vegetation common to the countryside surrounding the crater. The distinct character of this forest becomes most marked during summer, when everything around turns brown except the forest patches inside the crater. The forest is a pleasant surprise and an extremely soothing site. This forest belongs to a miscellaneous or mixed deciduous type, which contains semi-ever green components, beside the predominantly deciduous members. The relatively luxuriant growth of vegetation is due to the abundance of groundwater, high humidity resulting from the evaporation of lake water, minimal wind blowing and the relative confinement, allowing a localized regulation of temperature and other parameters.

The common names of the trees found in the crater are Babul, Dudhi, Bambu, Kadunimba, Subabhum, Sagwan, Vedi Babhul, Dhwada, Khair, Nilgiri, Gulmohor, Anjan, Salai, Chandan, Maharukh, Shisu, Shirsh, Karanja, Ashok, Umbar, Vad, Behada, Palas, Bel, Katesavar

The shrubs, climbers and herbs found in the area are known by their local names as follows the names also vary from place to place and from the community to community. The names are as follows:

<table>
<thead>
<tr>
<th>Shrubs</th>
<th>Climbers</th>
<th>Herbs</th>
<th>Grasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhaman</td>
<td>Vasan-vel</td>
<td>Ranbhag</td>
<td>Kusali</td>
</tr>
<tr>
<td>Chilati</td>
<td>Yeltura</td>
<td>Khadakshepu</td>
<td>Gondal</td>
</tr>
<tr>
<td>Korati</td>
<td>Gaval-vel</td>
<td>Rankanda</td>
<td>Pavanya</td>
</tr>
<tr>
<td>Kokan</td>
<td>Pival-vel</td>
<td>Muki</td>
<td>Marvel</td>
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<tr>
<td>Jhijula</td>
<td>Dudhi-vel</td>
<td>Ranmirchi</td>
<td>Taral</td>
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<tr>
<td>Chanbor</td>
<td>Muradsheng</td>
<td>Kandyasher</td>
<td>Bhol-gavat</td>
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</tbody>
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It is said that a natural forest once covered the entire basin and the lower slopes of the crater. The elders in Lonar village still recollect memories of the
forest so dense as to appear dark and scary, even on a sunny afternoon. It may have provided a place of natural refuge/sanctuary to several species, which found it difficult to survive in the harsher savannas of the surrounding areas. It might have even hosted large game, including deer and leopards. However, the plantations carried out by the Forest Department have substantially influenced the present forest cover. A fascinating sight is the presence of hundreds of peafowls, which live inside the crater. Besides other resident and migratory birds, you can spot monitor lizards, Hanuman langoors, chinkaras and gazelles, if you're luck. Some of the birds commonly found in the area are as follows and they are known to the local community by the following names: *Little Grebe, Grey Wagtail, Redwattled Lapwing, Whitenecked Stork, Coot, Pond Heron, Indian Moorhen, Little Egret, Greater Flamingo, Sandpipers, Spotbill, Duck, Great Reed Warbler, Black-winged Kite, Black Drongo, Small Green Bee-eater, Rufousbacked Shrike, Ashy Wren Warbler, Tailor Bird, Whitespotted Fantailed, Fan-tail Flychatter, Indian Peacock, Large Grey Babbler, Yellow-eyed Babbler, Magpie Robin, Jungle Crow, Grey Tit, Iora, Golden Oriole, Crow Pheasant/Coucal, Barn Owl, Grey Hornbill, Brahminy Duck, Roseringed Parakeet, Baya Weaver Bird, Chrimson-breasted Barbet, Indian Koel, Marsh Harrier, Shikra, Bush Quail.*

The mammals found in the area are as follows: Musk-shrew, Palm Squirrel, Black-naped Hare, Indian Langoor, Fruit Bat, Indian False Vampire, Insect Earing Bat, Barking Deer, Mongoose.

The reptiles found in the area are as follows: Monitor Lizard, Geckoes, Skinks.
Agriculture Inside The Crater

Around 52 acres of land at the base of the crater ravine, containing a perennial spring, is under agriculture. Being a land well-fed by a perennial spring, well-supported by abundant groundwater, and rich in minerals and nutrients, this patch of land is probably the most fertile and perennially productive, out of all the agricultural lands in the vicinity of the crater. The chief crops are vegetables, bananas and papayas. The crops are harvested round the year and consumed mostly within Lonar town.

The agricultural landholding inside the crater is said to be quite old. Traditionally, it seems to have affected the crater very little, as all the owners of the land reside in the town and there is no resident population on these lands inside the crater. However, in the modern context, the same activity is now posing a great threat to both the crater soils and the crater lake. This is due to the introduction of synthetic fertilizers and chemical pesticides, insecticides, etc. Even trace quantities of these chemicals are capable of causing utrophication of the lake and an irreversible change in the chemical characteristics of the soil. Besides the threat from the use of chemical agents, another negative impact of agriculture is in the form of its allied activities like cattle grazing, collection of firewood and minor forest produce and occasional hunting.

The Lakes: Lonar and Amber

Lonar Lake

The lake is circular except on the north-east side, where siltation caused by the Dhara has created small mudflats. The diameter of the lake is about 1800m. The crater is 160 meters in depth and is absolutely confined from all sides by the walls of the crater and there is not a single channel of water draining away from it, thereby leaving the lake waters stagnant for thousands of years, a large portion of the lake is rather shallow, preserving about 2meters of water during the monsoon months.
This may get reduced to only a few inches during the summer. However, the lake is dried up completely in the year 1991. The most striking feature of the lake is its extreme salinity and high alkalinity (the PH reaches the mark of 10.5 when tested with a PH paper). The perennial nature of the lake may be due to this high alkalinity, so that, as evaporation proceeds, the concentration of the dissolved alkaline matter is increased and, in due course, the evaporates begin to separate out, which gradually form a more or less continuous scum over the surface of water, thereby considerably retarding the rate of subsequent evaporation. The salinity and alkalinity of this continental, inland lake is attributed to several causes, which are discussed in the section on the hydrology of the lake (Raje Vishal, Kondolikar Nitin 14.03.03,Lokmat)

**Little Lonar or Amber Lake**

There is a small circular depression, about 700 meters away from the rim of Lonar crater closely resembling the main crater in its shape and characteristics. This is known as the Little Lonar and is believed to have originated from the impact of a smaller piece of the meteor which split from the main body, before it hit the ground. The diameter of this crater is app. 340 meters and rises 6 meters above the ground level. This crater also has a lake, fed by three streams which through the years have eroded the surrounding area causing the exposure of basaltic breccia. You can find pieces of rock showing typical shock metamorphosis caused by hypervelocity impact. Although no major geological research work has so far been done to establish the meteoritic origin of this depression, this evidences supports such a thesis and should be considered as an integral part of the precincts of Lonar crater. In 1973, Fredriksson suggested that Amber lake crater was formed by a fragment ejected from Lonar crater, whereas S. Master who surveyed the Amber crater in 1999 concluded that it was not a secondary crater, but was formed at the same time as the Lonar crater.
Around Lonar

Going down into the crater from the surface is an energetic business as there are no handrails or elevators. **There is a local belief that the crater itself is the body of the genius loci, the goddess Lonar Devi** and she does not take kindly to construction on her sides. All previous attempts at making a sturdier staircase have been washed away in the rains, and given the intensity of local feeling about it, the authorities have been content with the traditional carved rock path. This is quite steep and is much more difficult to go down than climb up, but the danger is more in overactive imaginations than in anything else.

Once down, almost the first sight that greets you is a ruined temple set into a dense forest. This was supposed to be a Rama temple but only the basic structure in stone is left now. **There are many temples set round the edge of the lake, all of them constructed in the 12th-13th century in stone** but the condition of all of them is not encouraging. What is amazing is the fact that people transported the stone down that steep face and then began to carve and build exactly as they were doing upon the surface at the time. It is an astonishing testament to the energy that would flame forth whenever the cause was a spiritual one. The Vishnu temple and Devi temple are in better condition than the rest but unless you are very determined you will find a full circuit around the lake a tiring business. It can easily take up to three hours, and the temples are scattered all around the rim. It is best to make an early descent as climbing back up under the midday sun is not the best option. Fortunately, the Maharashtra Tourism Development Corporation has built a tourist complex where all facilities are available. The sensible option is to drive down from Aurangabad the previous evening and make the descent bright and early the next day. That would give you adequate time to see all the temples, observe the detailed carving and architectural styles, as well as fully soak in the forest atmosphere of the crater.
But, the crater is not the only spot worth seeing in Lonar. A piece of the meteorite had broken off and smashed into the ground about a kilometer away, forming the Ambar Lake. It is a pleasant enough spot but entry is regulated by odd timings so just a look will suffice. Oddly enough the water in this lake is nothing like the main crater. Close by to the Ambar Lake is a nondescript little temple dedicated to Hanuman, the Hindu god of strength and intelligence. What is interesting is that the image of the god is an actual piece of the crater and for long its magnetic properties had fascinated the people who built a temple to house it. The god is supposed to be recumbent, resting after his mighty labors, well known in Indian myth. The meteorite chunk is brightly painted in the orange color that is preferred in this part of the world. The temple itself is a quiet, quaint little spot but it has to be reached through a bedlam of a market place. Once you break through, the landscape is the most flat and open space you will encounter for a while and the temple is set in the middle of this nowhere. The temple is open all day and there is no fuss about taking photographs. It is also mostly deserted all day which makes it an unlikely area of silence in India. There is a well adjacent to the temple, but the cool water is of dicey quality, so do not let thirst overcome discretion.

One the way back to, or coming from, Aurangabad, one has to pass Lonar town which is about 2-3 kms from the crater. In this little town one comes across a little black pearl of a temple built in the 10th century.

This is the Daityasudan temple, dedicated to Vishnu, and in spite of all the obvious ravages of time – it has no pinnacle for one – still in active daily use. This is not a fossil but a living temple, and the locals are not only unaware of its antiquity (the normal guess hazarded is 10,000 years!), they are bemused that anybody would want to come there for cultural reasons instead of for worship. The walls and pillars of the temple are full of elaborate and detailed carvings of significant passages from Indian myth as well as of the other gods who were in vogue in the 10th century. It is very similar in
overall structural concepts and construction to the famous Ambarnath Shiva temple near Bombay city which is an exactly contemporary structure. Ask for "The old stone temple" if you want accurate directions as nobody is aware of its official name. An interesting point about the sculptures is that some of them manifest erotic features but these are usually partially concealed in the niches and corners of the temple. That is easy to do as the temple is one of multiple infoldments, built on the three tier philosophy of earth, sky and heavenly levels of representation. Walking around the temple or merely taking up a strategic position upon the platform and observing the sculpture in detail is well worth the effort.

22 kms away from Lonar town is the town of Mehkar with an ancient temple too but the roads are not of an encouraging variety. Not only is it rewarding in itself, it also makes for a break from the standard tourist circuit. However, the place is growing in popularity and in another decade the now welcome absence of any tourist trap trash or touts may soon become a dream.

**Getting to Lonar**

Lonar is well connected from all directions by means of airways, road ways and railways. The various connections are as follows:

**By Air**

Aurangabad is the nearest airport at approx. 165 kms. The airport is 10 km east of the city. Indian Airlines flies there from Mumbai and Delhi & Jet Airways has 2 flights from Mumbai.

**By Rail**

Nearest railhead is Malkapur on the Mumbai-Bhusawal Line and Jalna (near Aurangabad) on Mumbai - Manmad - Nanded Line. Aurangabad railway station is located near the Tourist Office on Station Road. To Aurangabad
there are 3 trains from Mumbai, 5 times a week from Delhi and everyday from Chennai.

By Road
From Nagpur, it is 388 kms. by Nagpur - Washim - Lonar route.
From Aurangabad, it is 170 kms. The route is Aurangabad - Jalna - Sindhked Raja - Sultanpur - Lonar Crater. There are a few state transport buses that ply between Aurangabad and Lonar, however the best way to go is by private car or taxi.
From Buldhana to Lonar: 95 kms.
From Akola to Lonar is about 125 kms
Best time of the year is August to February. Summers are hot in the interiors of India but if you do not mind the heat there is no reason why you cannot go at that time.

Accommodation
Tourists visiting the region can have a comfortable stay at the various Government and non government hotels and guest houses available in the area. The Maharashtra Tourism Development Corporation has its property by the name of Crater View Tourist Complex, which has 8 Suites, 16 self contained Dormitories, Exhibition Halls, Conference Hall, Restaurant Facility etc.

Other than the above, the Government Guest House, situated at the rim of the crater, which has 4 rooms. This is a very basic rest house but it is clean and the cook there turns out delicious Maharashtrian fare.
Touristic Potential and the Dangers to the Fragile Ecosystem of the Lonar Crater

The Lonar Crater is the only meteorite crater in basaltic rock, very much like the craters on the moon. It is a scientific phenomenon and a national treasure that must be preserved. The crater has not only been attracting numerous foreigners to study the impact of a meteorite that occurred 50,000 years ago, but also tourists from around the country to enjoy the beauty and visit the temples, some of which date around the 11th Century.

A road runs around the upper rim of the crater with look-out areas. Unfortunately the path inside the crater, along the lake runs only part of the way. Though there are others that one can stroll along, admiring the beauty and tranquility of the place.

The government is hoping to make it a “national park”, in order to put restrictions on harvesting of wood, and rampant farming inside the crater. Much is yet to be done to preserve the place.

Peacocks and monkeys are sighted in abundance as are numerous ducks and partridges. Winter, brings migratory flamingoes. Lonar is a quiet village, and has a character of its own, unaffected by the historical importance of the temples or the crater.

The crater has now world-wide recognition, few years ago plans of building a Hotel were made but they were rejected as they were considered to be harmful for the crater. Anyone can enter the lake and damage it, no security system is present. Farming is done near the crater causing considerable damage to the soil. Fertilizers mix with Lonar water as small streams meet this lake. The city development taking place is approaching towards the lake. Plastic wastes are put by people visiting the temples within the lake. The main threat is possessed by a lake placed in the village near to
Lonar. The water from the lake situated in village evaporates and much of it goes into the crater, water seeps through soil and reaches Lonar crater. This results in increasing height of Lonar and losing its salinity.

This crater has a great importance in Geology and Astronomy. This place has to be saved and preserved. Indians have started looking into this matter which has to be more focussed and sharp. But it is important visiting and studying this crater for a astronomy lovers.

**ECONET, Pune suggested that the following activities to be banned within the crater or its precincts**

The activities listed below should be completely banned within the geographical area of the crater, to ensure protection of the ecosystem:

1. Digging, building, construction of roads, etc. within crater area
2. Hiking, climbing over the crater slopes
3. Boating in the lake
4. Removing geological materials out of the crater
5. Lifting water from crater lake
6. Gardening and landscaping inside the crater
7. Use of chemical agents like soaps, detergents, fertilizers, pesticides
8. Introduction of exotic species
9. Agriculture or cattle grazing
10. Hunting of birds / animals
11. Deforestation / tree felling
12. Collection of minor forest produce
13. Releasing sewage or other liquid affluent into streams that enter the crater
14. Leaving / dumping plastics or such non-biodegradable materials
15. Extraction of salts from the lake waters
16. Smoking and consumption of liquor
17. Camping / cooking / carrying eatables inside the crater.
18. Lighting fire in any form.
19. Playing Radios / Cassettes at high volumes, screaming / shouting, etc.
20. Throwing stones at birds and animals
21. Offering food to wild animals.
22. Collecting samples of lake micro flora without prior permission from a competent authority (the District Collector).
23. Overcrowding (exceeding the limit of 100 persons entering the crater at a time)
24. Removing or replacing any part of a monument
25. Writing names, graffiti, painting, etc. on the monuments
26. Residing, camping, cooking inside the structures
27. Leaving behind large quantities of ritual offerings (flowers, coconuts, etc) in and around the temples
28. Setting up food stalls / shops inside the crater during Yatras / festivals
29. Carrying electricity connection inside the crater for Yatras / festivals
30. sanitation inside the crater (especially during large scale gatherings of pilgrim)

Some of the recommendations for taking care of the fragile ecosystem of the region and to maintain the ecological balance of the Lonar Crater are as follows:

1. A certain portion of Ejecta Blanket and Rim have survived the impacts of human activities and have retained their original characteristics. This area should be immediately declared as a “No Development Zone” and the necessary amendments should be made in the Lonar Town Development Plan.
2. A stream called “Nobbi Nala” entire the crater from the north eastern nide after flowing through the entire Lonar town. The flow of this stream should be immediately divided away from the crater, no it remain
3. The Public Works Development has decided to widen Lonar. However, at one point the pond passes almost tangentially to the rim of the crater. It is
recommended that the proposed plan of widening be reconsidered and modified immediately. It is recommended that in the modified plan, approximately half a kilometer portion of the pond (as shown in map) be diverted away from the crater.

4. The State Archeological Department should immediately include all the archeological points in the region in the list of protected monuments.

5. A ban should be immediately imposed on the use of chemical fertilizer and pesticides and other toxic metering in the agricultural fields inside the crater.

6. A ban should be imposed on the use of detergent at Dhara.

7. The motorized lifting of water from the crater lake / springs should be banned.

8. Forest Department should immediately and completely stop the activities of tree felling, hunting and cattle grazing by local people include the crater.

9. Children presently use the precincts of the temples as a playground. Such practices damage the structure as well as the manually of the temples. This has been noticed especially in case of the Daityasudan temple. Such practices should be stopped immediately.

10. The hutsments on the rim should be removed immediately and relocated elsewhere in the township, preferably towards the north-eastern direction.

11. Certain illegal concrete structures have appeared on the rim. These should be removed immediately.

12. Keeping in view the present legal framework and the institutional structure in our country, it is strongly recommended that the entire geographical area of the Lonar crater should be notified as a National Park as early as possible. Simultaneously, all efforts should be made to get the crater included in the list of World Heritage Sites.

13. The Forest Department presently lacks the machinery and man-power required to protect the crater ecology. It should immediately make the
necessary provisions for additional / qualified staff and other necessary
equipment to ensure an effective conservation of crater ecology.

14. A strict vigilance should be established to prevent the removal or
smuggling of important geological materials from the crater. The
responsibility of enforcing this regulation should vest principally with the
Forest Department, and also with the GSI.

15. An Apex Body (Lonar crater Conservation and Management Committee)
headed by the District Collector and comprising of Government
authorities, representatives of local citizens and NGOs should be
immediately formed, and it should be vested with adequate authority for,
and responsibility of, conserving and protecting the crater ecosystem.

16. For an effective regulation of the activities of local inhabitants, pilgrims,
and tourists inside the crater, a Visitor Management Centre should be
established at Lonar, at the earliest. The responsibility of running the
center, the orientation cell, geo-ecological exhibition, etc., should be
taken by the MTDC with the help from other relevant departments
wherever necessary.

17. The GSI should publish a comprehensive document / white paper about
the crater, providing detailed and authentic information on all the
important ecological facts and related theories. It is envisaged that the
document would be useful not only to researcher but also to general
readers, tourists, planners and decision makers.

18. The ASI should immediately take up the repair and restoration of all
archaeological structures. It may be noted that in case of monuments at
Lonar, the ASI has done next to nothing during the last hundred years.
Similarly, instead of merely numbering these entities, their original names
be researched and then made known to public.

19. During Kamaljadevi festival, a very large number of pilgrims enter the
crater. It is recommended that during the festival period railings should be
erected along the path leading to kamaljadevi temple, to prevent the
pilgrims from scattering into crater.
20. Similarly, during Kamaljadevi festival, shops, stalls, etc. Should not be allowed inside the crater or on the rim. Likewise, temporary electricity connections and lightings inside the crater should also be banned.

21. All agricultural activities inside the crater should be stopped.

22. An exhaustive documentation of the biodiversity of crater ecosystem should be carried out.

23. In order to provide a quite and serene surrounding to the crater, a forestation should be done on a larger scale in its vicinity.

The Maharashtra Tourism Development Corporation (MTDC), has planned a Rs 5 crore project for Lonar with Japanese aid. The MTDC has proposed to protect the crater by banning all activity within a stipulated distance from the lake.

As the government decides on its plan of action, Lonar awaits badly needed help to keep its unique ecosystem afloat.
CHIKHALDARA-MELGHAT : A NATURE LOVER’S DELIGHT

Introduction

The whole area of Chikaldara and Melghat is a nature lover’s delight par excellence. After a visit to this hidden treasures of nature one wonders why hasn’t this been declared as Special Tourist Area (STA) by the Tourism Ministry as yet !!!

Chikaldara is the diamond in the necklace of the Satpura ranges and the much loved hill station of Vidarbha. Cascading falls, panoramic view of herculean mountain ranges, exotic wildlife and amazing customs of tribal life are the unique attractions of Vidarbha's paradise, ‘Chikaldara’. Rich in forests, scenic beauty and wild life it is a paradise for lovers of nature and wild life. Featured in the epic, the Mahabharata, this is the place where the Mighty Bheema killed the villainous Keechaka in a herculean bout and then threw him into the valley. It thus came to be known as Keechakadara -- Chikaldara is its corruption. But there's more to Chikaldara. The sole hill resort in the Vidarbha region, it is tucked away at an altitude of 1118 metres amid the Satpura mountain range and has the added dimension of being the
only coffee-growing area in Maharashtra. With valleys full of velvet mist and majestic trees, an abundance of natural scenery, exciting wildlife in the nearby Melghat Sanctuary, breathtaking waterfalls and a placid lake, Chikhaldara has all one need for an enjoyable holiday. What’s more, the cool breezy climate makes it an excellent place to repose in summer and one’s dream of walking in the clouds could become a reality sooner than one can think. This is just the place to escape the scorching autumn heat of the plains. As a matter of fact, the British from Nagpur took residence here as a retreat. Chikhaldara has escaped the commercialisation that most tourist spots in Maharashtra have been subjected to. This is one place where you can really enjoy your freedom, with no pesky tour guides or taxi drivers for company. Peace and quiet are yours for sure and you can be one with nature here. Sit under a shady tree, listen to the birds singing, streams gurgling and indulge in hobbies like birdwatching, photography or even aeromodelling.

Close by is the famous Melghat Tiger Project. This is one of the world’s most important tiger breeding habitats, affording a continuity of around 2,700 sq. km. It abounds in wildlife -- panthers, sloth bears, sambar, wild boar, and even the rarely seen wild dogs. Melghat means 'meeting of the ghats' which is just what the area is, a large tract of unending hills and ravines scarred by jagged cliffs and steep climbs. At the northern extreme of the Amravati district on the border of Madhya Pradesh, lies the Melghat Tiger Reserve in the Southwestern Satpura mountain ranges. The exquisite hill forests support thick
undergrowth and moss-covered trees underscore its virgin confines. One of the lesser-known wilderness areas, it offers fine trekking opportunities through its magical glades, a pleasure not always possible in the Indian jungle. As R G Burton says in his book Sport and Wildlife in the Deccan: "much like an earthly paradise as anything can be in this unsatisfactory world."

**History**
Chikhaldara’s history goes right back to the times of the Mahabharata. Legend has it that the Pandavas spent the last year of their exile hiding in the jungles here. This is the place where Bheema killed the villainous Keechaka and threw him into the valley. This valley, which was known as Keechakdara earlier, came to be known as Chikhaldara over the years.

Vairat, a village near Chikhaldara finds mention in the epic Mahabharat. It was a full fledged kingdom and the current village was once the teeming capital of that kingdom.

Melghat was an automatic choice when Project Tiger was launched in 1973 for Protection and habitat management, in terms of biodiversity conservation and ecological sustainable community development.

**Discovery and Background**
In a way Capt. Robinson can be called as the Father of the teeming hill station of Chikhaldara. Early in the 19th century this British officer,
scrambling over the thickly wooded slopes of Satpura hills reached this serene surrounded by forest and was quite glad to find the enchanting views at an altitude of 3300 sq. ft., 992 m located deep within the folds of the hills. Thereafter, Chikaldara came into being as a hill station. During the British rule, 80 hill stations were developed all over India and "Chikaldara" was one amongst them.

Melghat area was declared a Tiger Reserve in 1974. Presently, the total area of the Reserve is around 1677 sq. km. The core area of the Reserve, the Gugarnal National Park with an area of 361.28 sq. km., and buffer area of the Reserve, the Melghat Tiger Sanctuary with an area of 788.28 sq. km. (of which 21.39 sq. km. is non-forest), were together re-notified by the state government in 1994 as Melghat Sanctuary. The remaining area is managed as a 'multiple use area'. Previously, Melghat Tiger Sanctuary was created in 1985 with an area of 1597.23 sq. km. Gugarnal National Park was carved out of this Sanctuary in 1987.

**Physical Features**

Melghat Tiger Reserve is located on southern offshoot of the Satpura Hill Range in Central India, called Gavilgarh hill. The high ridge running east-west which has its highest point at Vairat (1178 m. above msl.), forms the southwestern boundary of the Reserve. It is a prime habitat of the tiger. The forest is tropical dry deciduous in nature, dominated by teak *Tectona grandis*. The Reserve is a catchment area for five major rivers viz. Khandu, Khapra, Sipna, Gadga and Dolar, all of which are tributaries of the river Tapti. The Sipna and Dolar flow through the core The northeastern boundary of the Reserve is marked by the Tapti river. Several pools and streams course through the area, but in the summer only a few small water sources remain. A few perennial streams ensure both water and pasture for herbivores. Small traditional earthen dams are constructed every year to augment the water sources and conserve soil.
Melghat's rugged topography is characterised by steep cliffs and rocky ravines and more than the forest guards, this is what protects it from encroachers. The hills are between 200 to 1,500 m high, with Vairat Devi Point the tallest at 1,178 m. An irregular succession of hills and valleys vary in altitude and gradient, with numerous spurs branching off from the main ridge. Between the plateau and hills are fodder-rich saddles used extensively by wild animals. Teak forests and bamboo thickets combine to form prime tiger habitat... remnants of the once grand forests of Central India.
Melghat is the prime biodiversity repository of the state. Nature has offered protection to Melghat in the form of a rugged topography with only a few entry points. The Makhala, Chikhaldara, Chiladari, Patulda and Gugamal are the large plateaux amidst rugged terrain. Continuity of forests in Satpura Hill Range guarantees the long-term conservation potential of the area.

Population And Settlement
As per the 2001 census of India the total tribal population in Maharashtra is 73.18 lakhs amounting to 9.27% to the total population of the State. Some of the major tribes of Maharashtra are Bhils, Gonds, Mahadeo Kolis, Malhar Kolis, Warlis, Koknas, Katkaris, Thakars, Kolams, Andhs. Pardhans etc. Maharashtra State ranks fourth after Madhya Pradesh, Orissa and Bihar as far as population size of the tribals in the country is concerned. And in Maharashtra most of the tribal population is concentrated in Vidarbha region.

Social Life of The Tribals
Social & cultural life of tribals have survived since times immemorial because of higher degree of solidarity, respect for traditions and customs, meanings associated with social actions, less importance to money and a very high degree of sense of sharing which is still prevailing amongst them, binds them together.

Despite of introduction of several schemes for the tribals they have not shown much progress. One of the reason for this is their nature of shyness and lack of contact with urban world and lack of knowledge of regional, national and English languages.(lingistic knowledge). Things are however changing due to introduction of Ashram Schools. Tribes such as Koknas, Mahadeo, Kolis have shown signs of progress.

The total human population in 61 villages of Chikhaldara-Melghat region is about 24,700. The people of Melghat are mainly of tribal origin, belonging to
Korku, Nihal, Gond, Balai, Gawalis, Gaulans and Wanzaris tribes. Almost all inhabitants depend on forest for their domestic need of firewood, timber, fodder and medicine. Their main source of income is from labor works and seasonal agriculture. They augment through collection of non-timber forest products like fruit, flowers, gum and parts medicinal plants. These include Mahuali (flowers as well as seeds), Charoli, Gumcula, Dhawada, Tendu-leaves, Musali (Medicinal Plant), Lae Shade anchor etc. Their food is enriched through rhizomes, fruits and other parts of the wild plant species. While some earn their living by fishing daily, for others it is a common hobby. However, fish supplements their diet with protein. They sometime indulge in poisoning of water by using part of plant species to kill fish. They also use this technique occasionally for killing Sambar, Wild Beer, Gray Jungle Fallow, Pea Fall and hare.

Legend

The Bhavai Pooja is one of the local customs of the Korku adivasis, performed annually at the onset of the monsoons. Children between 10-12 years perform the puja. They bathe in the nala or river near the village, catch a frog and bring it back to the Hanuman temple, where the frog is put in a small pot of water. The direction in which the water splashes is believed to indicate the direction from which the rains will come. The children then put the frog in a bamboo basket after smearing it with wet mud and go from house-to-house
singing that the pools have all dried up. People who hear their song, come out of their houses and pour water over them. In the evening, the frog is brought back to the temple and released into the nala or river the following day.

Rupa Bhavala is a nala that originates from a plateau in Gugarnal National Park and joins the Gadga river as two waterfalls, and ultimately meets the Tapti. Local legend has it that the place is named after two lovers who jumped off the ledge here, in the face of parental opposition. The story of the girl, Rupa and her young lover is believed to symbolise eternal love, in the union of the two waterfalls. (*Pimpalkhute Prof. Madhav 01.01.03, Deshonnati*)

**In and Around Chikhaldara**

Surrounded by the Satpura range of mountains and located in the Gavilgadh hills, Chikhaldara has a charm of its own. Cool and dry for most of the year, the monsoon lavishes nature with beauty that needs to be seen to be believed. Chikhaldara is meant for those who like nature but mostly its peaceful surroundings and climate endear it to the visitor. The scenic beauty of Chikhaldara can be enjoyed from **Hurricane Point, Prospect Point, and Devi Point.** There are also a few locations tourists should visit.

**Devi Point**

Situated near Shakkar lake it is 1.5kms from Chikhaldara Bus stand. This cave temple lies under three huge slabs of rock. We have to go down by using steps. There is a temple of Goddess inside the huge stone. One virtually has to crawl into the temple, as the height is very short. The water from the mountains continuously seeps through the ceiling of the cave and drips onto the floor. You'll have to remove your shoes to enter, treading over the cold and wet floor to get to the inner sanctum. The Goddess is main deity of 'Korku' tribe and thus it is a pilgrim centre for them.
Mozri Point
It is just near Devi Mandir and cocooned by handsome hills on all sides, this is a good place to get your camera clicking. You can spot the west side of the Gavilgadh Fort from here as also the Mozri village deep down in the valley. There is a permanent helipad here.

Malviya or Sunrise Point
The road to Lawhada further leads us to Malviya Point. We have to go down the steps to see the point. We can also see some part of Bhimkund valley and Paratwada city from here. This point faces towards East and thus gives an excellent view of the rising sun.

Sunset-Point
Situated on the Vairat hills, this point gives the scenic view of sunset. Chikhaladara is to the east from here and to west lie the seven folded hill ranges befitting the Satpuda.

Hurricane Point
It is situated at southern region of the upper platau of chikhaladara. Close by is government garden. It gives a bird’s eye view of Gawilgarh fort, Mozari village, Vairat hills and the surrounding valley.
Prospects Point and Thakur Point
On the way to 'Pandhari Village' there comes 'Deepshikha Military School'. There is a two way from this school. While one leads us to Prospects point and the other to Thakur point. Thakur point gives an aerial view of Semadhoh forest.

Monkey Point
This point is inside the campus of Maharashtra Forest Ranger's College, on the way to 'Vairat'. The valley is so deep at this point that the base of the valley cannot be seen with naked eye. One has to be careful at this point, as there are no railings to support.

Goraghat Point
Maharashtra Tourism Development Corporation has a resort near Pandhari village. A road by the side of this resort leads to Goraghat Point. Since the place is very quiet it gives an opportunity to be one with nature.

Kalapani lake and Shivsagar point
On the way to upper plateau one comes across a lake constructed by the Maharashtra Jivan Pradhikaran Mandal. Nearby on find a small temple dedicated to Lord Rama. A further drive on this road takes us to Shivsagar point. At the end of this road, one has to treck up the hill. Many layers of Satpuda hills are visible from here. This point gives a spectacular view of sunset. One can also see Hariken, Goraghat, Mozari, Vastapur and Shahanur Lake from here.

Bhimkund
It is place of mythological importance and thus visited by pilgrims. It is said that this is the lake where Bheema washed his hands and bathed, after he killed Keechaka and threw his body in the valley called 'Kichakdara'. Thus the name, Bhimkund.
This place is situated in 1.5km south of Alladho village, on the way from Paratwada to Chikhaldara via Motha. Bhimkund is nearly 3500 ft. deep. It offers fascinating view of the waterfalls and cascades during rainy season. One can even view Vir Dam Point from here.

**Vairat Devi**

Vairat is a small village, about 10kms. from Chikhaldara. On the way to Vairat one can enjoy the breathtaking view of a beautiful natural pool. There is an ancient goddess-temple situated to the west of Vairat hills. The way to that temple is very critical. One has to pass the valley with the help of rope to reach the mouth of underground way. After crawling for about 100 to 150 ft. in the underground path, one can reach to original temple. Thus to facilitate those who cannot make it to the original one people have built another new temple at the starting the underground path. *(Chitale S.K 08.12.03 Lokmat)*

**Vir-Lake**

This Lake is the catchment area of a dam built in Dec 1890 by the soldiers of the erstwhile British Government. Since the dam was built by the soldiers, thus the name Vir Lake. Initially the water from this lake was supplied to Chikhaldara town. It also has an old garden but it is not maintained well.

**Panchbol (Five Echo Point)**

This is one of the famous and important points, where we can experience the magic of nature. This is just 4km. from Vir Lake and is well connected by an all weather surfaced road. One can see coffee plantation on the way. This is very deep and huge valley that connects five hills edges. When one shouts into the valley one can hear five echoed or reflected voices. That's why this point is known as Five Echo Point. Locally it is called Panchbol Point since Panchbol in Marathi means “calling out five times”.

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Mahadev Temple
This temple is about six kilometres from Kalapani Lake. There is also a way from Mozari village to reach this temple. On every Monday, in the auspicious month of 'Shravan' (Jul-Aug) people in large numbers throng to this temple to offer their prayers to Lord Shiva.

Semadhoh

Semadhoh is situated in the national park region of Melghat tiger reserve. The 25 kms-long road from Chikhaldara to Semadhoh passes through the deep & dense forest. One can feel the freshness of the greenery and can also see wild animals like Peacock, Deer, Wolf, Pig Gourus all along this way. The Tiger Project has its own resort at Semadhoh where accommodation is available at a very nominal rate. The nearest forest rest house is at Kolkaz. The resort also houses a museum that is worth paying a visit especially for the slide show on the wild animal. On payment basis, the project office arranges trips to the reserved forest area by mini bus. Two such trips start from the resort at 4pm and 5pm. During the trip one can see the various wild animal like Leopard, Tiger, Beer, Wild Buffalo, Deer, Wolf, Snakes and various Birds.

The Maharashtra Tourism Development Corporation (MTDC) provides water-sport facilities at Semadoh Lake. It has a few paddleboats. Though the water in the lake looks green, it is quite safe to swim in.
Shakkar Lake

Shakkar Lake is on the way to Gawilgarh fort. This lake serves as a reservoir from where water is supplied to the near by areas. Boating facility is available here. The tourists can enjoy the Speed Boat, Pedal Boat, and Scooter Boat etc. Recently angling facilities are added to the activities in this lake.

Government Garden and Pandit Nehru Botanical Park

The upper plateau of Chikhaldara is thickly covered with trees and human settlement is almost non-existent. The government garden is situated at this upper plateau. These verdant gardens, developed by the forest department, houses a varied number of trees and flower plantations that are immensely pleasing to the eye. Visitors can enjoy an evening in the park when the water fountains come alive. It is open for visitors from 8.00am morning to 7.00pm evening. It was earlier called as 'Company Garden' because the British Company officials raised it. Thus garden houses a variety of flowers and plants. A swimming pool run by 'Hanuman Vyang Prasarak Mandal' is worth giving a try. A special area of this garden is earmarked for variety of rose saplings. On can also find many rare plants of the cold region. The special attraction of this garden is a mini train that takes tourists on a joyride. This train is very popular among the kids.

Excursions – Forts

Gavilgadh Fort

Shrouded in mist and myths is the Gavali tribal fort of Gavilgad or Gavaligad, on the Chikhaldara plateau, now under the Melghat Tiger Project. Featured in the epic, the Mahabharata, this is the place where Bheema killed the villainous Keechaka in a herculean bout and then threw him into the valley. At Gavilgad, the bloody history continues, though the serenity of the dense forests around it camouflages the turbulent past.

Built by the Gavlis, or cowherds in the 12th/13th centuries, the fort was occupied later by the mighty Gonds, the last of the sub-continental powers to
fall to the Mughals. Today although no signs of dramatic battle remain, the fort walls and ramparts still stand. Four gates guard the strategic entrances with only a cool wind whistling past them. There is no trace of the tunnel, reputedly linking it to the nearby Gond fort at Narnala. You could trek to Narnala, or drive through the thick forest to discover yet another blend of Gond and Mughal influence.

Later, the rulers of the Bahmani dynasty rebuilt Gavilgadh Fort in the 15th century. This fort has witnessed many a battle, occupied as it was by the Mughals, Marathas and the British. You need an entire day to see the fort completely. Inside, the remains of the inner fort and cannons can be seen.

The three major forts namely Gavilgrah named Amner. Three forts stand witness legendry historical background of the area.

Gavilgrah is located on a Chikhaldara Platau is set to be established in the 12th century by a Gawali King a descendent of yadavas of devgiri. However this fort built in mud was Forty Fide by the bahamani being Ahmad Shah Wali. The fort under wrote further underwent fortification around 1471. The forte stand on a lofty mountain on consists of a inner fort. Which front to the south and an outer fort which has a third one which covers the approach from the north. The walls are strongly built and fortified by a rampart and towers. The outer fort is tempered together while inner has three large gate fort. The Fatheh Darwaza, Kichakdara Darwaza and Delhi Darwaza. The Delhi Darwaza consists of three gateways. The outer most gateways has a symbol with a palm tree with on a both either side tiger holding in its close and mouse five elephants. Above each tiger there is a double headed eagle. These seem to be Gods where as some say that they represent a emblems of legend other emperors. The fort has eight tank which retain water even during bol season.
Jama Mazeed built on the highest point of the fort at the Fatheha Darwaza, was repaired in 1486 A.D. by Fathefulla. The fact of repairs is recorded in an encryption on the Mazzeed. He also put an adorning symbol on the Shardul Gateway of the Delhi Darwaza. The Gawilgarh Fort is regarded as superior fort in strength and to be master of Gawilgarh men of mistry of Berar. In 1577 the Behram Khan built a fine bastion in the south-west face on the fort. In Ain-I-Akabari Abul Fazal calls "Gawilgarh a fort rest of almost match legends according to him Gawilgarh sarkar was the richest of the thirteen parganas in to which Berar was divided. After Maughal Empire Gawilgarh fort was passed to Hyderabad and later was acquired by marathas in 1751. The fort finally passed to the East India Company and dismantled in 1858 with the threat that it would be ceased by Tatia Tope. (Jhade Vikas 27.03.03, Lokmat vishesh)

The most interesting object in the Fort is a gateway called the Bara Darwaza. This is the principle entrance to the Main Fort.

**Narnala Fort**

Narnala Fort Sixty-five kilometres away, near Semadoh Lake, lies Narnala Fort with its 67 bastions and 25 gates.

Narnala is situated in Melghat at an altitude 21° 10’ North and 77° 00’ East. It is 66km. North from Akola. Narnala is 3161 feet from MSL. Fort was built scientifically considering natural interference like rain wind etc. Narnala alias Shahanur fort consists of three small forts namely Zafrabad, Narnala and Teliagarh. Narnala is one hour walking distance from Shahanur, 24km from Akot (Akola). Now, there is a road from Akot via Popatkhed for vehicles.

This is historically a very famous fort which is very deep and with dense forest land situated on the hills of Satpuda i.e. at the hilly side of the Melghat. (Narnala is at 24km from Akot and 66km from Akola on North). Nowadays we can reach the fort by vehicle.
There is confusion about the construction of Narnala fort. The historians have said that Ninth Badshaha Shahbudeen Ahmadhaha Wali. (1422 AD to 1436 AD) constructed Gawilgarh fort and made renovation in Narnala fort when he stayed at Elichpur. It means that the Narnala fort was constructed before Bahamany rule. Still it is not conformed as to exactly when it was constructed as the concrete information is not available anywhere.

Some historians have said that the Gond rulers ruling over Melghat region constructed this fort (original owner). But this is also not supported by all the historian. After the Ahmadshaha second (1436 to 1458) became the ruler. He had got married with the daughter of Nashirkhan (subhedar of Khandesh). Due to misunderstanding between Allaudin and his wife, Nashirkhan made affable of Berar Region in 1453 AD. He defeated first to the Gond. Gond living in Chorda and started his rule over Chorda fort. Then by motivating some sardar of berar region he strengthened his provision of attack over Narnala fort. Nashirkhan achived many expectations. He had motivated the Elakhandipari of Berar and leader of army. By this provision Nashirkhan easily took change over Narnala fort in 1453 AD.

**Amner Fort**

It is located beyond village 'Kalamkhar' near village 'Zilpi' about 10 km. from 'Dharni' on 'Barhanpur Road'. The Fort is constructed in burnt bricks and it is located at the confluence of rivers Tapti, Sipna and Gadga. The view from the top of the Fort of the conclease from about and height of more than 100ft. gives one idea of the magnifications of the fort.

However, the emproachment within the fort area for cultivation of crops have rendered the fort to an non exisstance.
Excursions – Wildlife

Chikhaldara Wildlife Sanctuary

Chikhaldara Wildlife Sanctuary is located in Amaravati district of Vidarbha region. This sanctuary is named after "Keechaka". Tourists can find Panthers, Sloth Bears, Sambar, and Wild Boar. One can even spot Wild Dogs over here.

Gugamal National Park

Gugamal National Park is located in Chikhaldara and Dharni tehsils of Amaravati district in Satpura hill range. There are 750 species of plants in the area. There are 260 species of birds in the published checklist. Serpent eagle, Paradise Flycatchers are commonly seen in the area. The area is rich in wild mammals. Tiger, Leopard, Sloth bear, Wild dog, Jackal, Hyaena, Chausingha, Sambar, Gaur, Barking, deer, Wild boar, Monkeys are commonly seen. Ratel, Pangolin, Cheetal, Mouse deer are rarely seen. There are about 25 types of fishes, many varieties of Butterflies.

Wan Sanctuary

Wan sanctuary is located in Melghat area of Amravati District. It is an extension to the Melghat Sanctuary on southeastern part. This area is part and parcel of Melghat and is rich in floral and fauna biodiversity. The hilly rugged terrain possesses Tropical Dry Deciduous forests.

The main species of teak, Air, Tiwas, Dhawda, Kusum, Moha and Bamboos. The area is rich in Tigers, Leopards, Hyena, Wild dogs, Bison, Sambar, Barking deer, Wild boar are major herbivore species.

How To Get There

Chikhaldara offers a refreshing and pleasant change for the tourist in India, who looks forward to being away from teeming crowds and a not-so-lonely planet.
By Air

Chikhaldara is about 237 Kms from the nearest airport Nagpur.

By Rail

Nearest railway station is Badnera at 110-km on the Central Railway branch line.

By Road

Nearest bus depot is Amravathi 100-km. Regular State Transport buses connect Chikhaldara to Amravati, Nagpur, Wardha, Akola and other cities of the state.

Weather

Chikhaldara-Melghat has three distinct seasons namely Summer, Monsoon and Winter season. The considerable altitudinal variations in Chikhaldara gives rise to smart variations in rainfall which ranges from 1000 mm to 2050 mm. The rainfall is received in 50 to 60 rainy days during July to September. Winter is cool and summer is extremely hot. Temperature varies from 6 degrees Celsius to 43.6 degrees Celsius. Chikhaldara has a distinct climate from that of the adjacent area, basically by virtue of its location at an altitude of 1100m above MSL. Chikhaldara has an average annual rainfall of 154 cms. Temperatures vary from 39 C in summer to 5 C in winter. October to June is the best time to visit.

Biodiversity

The biodiversity of Chikhaldara-Melghat is unmatched in terms of the sheer number of species of flora, fauna and avi fauna. While complete list is an arduous task, what follows is an indicative list:

Flora - More than 700 plant species have been listed in this reserve repository. There are 90 tree species, 66 shrub species, 316 herb species, 56 climbers, 23 sedge species and 99 grass species. Approximately 50-75 more species have been identified and several more are expected to identified in the future at the
Melghat Tiger Preserve. The most commonly occurring species are *Lagerstroemia parviflora*, *Lannea coromandelica*, *Emblica officinalis*, *Terminalia tomentosa*, *Anogeissus latifolia* and *Ouienia oojeinesis*. Bamboo *Dendrocalamus strictus* is widespread.

**Avifauna** - There are 260 species of birds in the published check list of the Melghat Preserve.

**Fauna** - Tiger, panther, sloth bear, wild dog, jackal, hyena, chausinga, sambar (largest deer on earth), gaur, barking deer, ratel, flying squirrel, cheetal (type of deer), nilgai, wild boar, langur, rhesus monkey, macaque, porcupine, pangolin, mouse deer, python, otter, caracal, blacknaped hare are found. The animals here are well known for their shyness and hence are inherently elusive.

**Touristic Potential**

The touristic potential of Chikhaldara-Melghat region is immense. Firstly, while Chikhaldara has already found mention as one of the best hill stations, Melghat has become synonymous with the majestic tigers. Secondly, the undulating terrain is a nature’s gift for adventure activities. Thirdly, the tribal lifestyle itself is a potential cultural and ethnic tourism product. On the top of it, the unique biodiversity of the region holds enough eco-tourism potential. Therefore we can summarise the potentialities of Chikhaldara-Melghat into the following:

1. Eco-Tourism
2. Adventure Tourism
3. Tribal Tourism

**Eco-Tourism Potentials**

**Animal / Jeep Safaries**

Watching the wildlife from the back of an elephant or a horse, giving time a break, has got its own charm. For those who want speed and style, watching
the nature from the luxury of a jeep is equally thrilling. Thus such safaris can attract nature loving tourist not only from India but from abroad.

**Trekking**
There is nothing like being one with nature and exploring it with one’s own pace. Chikhaldara-Melghat has some unparalleled trekking routes giving a rare opportunity to its visitors discover for themselves the numerous species of flora and fauna they never knew existed.

**Bird Watching**
If its tigers were not famous, Melghat would have been known as a raptor or eagle sanctuary. It is, in any event, a birdwatcher's dream come true. If you’re an avid birdwatcher, there’s a visual as well as aural feast laid out for you. Over 250 species of birds have been listed in Melghat. These include the Crested Serpent Eagle, the Golden Oriole, the Leaf Bird, the Paradise Flycatcher, the Racket Tailed Drongo and the Stork-billed Kingfisher. Local NGOs like Nature Conservation Society, Amravati conducts regular bird watching trips for the bird lovers.

**Fishing**
The presence of numerous water bodies in this region gives ample fishing opportunities. One must appreciate the traditional methods used by the tribals of the region to catch fish. Catching a fish with those indigenous methods is an unforgettable experience by itself.

**Adventure Tourism Potentials**

**Paragliding**
The rugged terrain of the region can make the paragliding an instant hit. Paragliding in this region besides being an adventure sport, can offer taking a bird’s eye view of the breathtaking natural beauty.
River Crossing
The tributaries of Tapti can offer River crossing opportunities. River crossing offers a great physical activity and at the same time it’s fun too !!!

Rock Climbing And Rappelling
Rock climbing and rappelling is a popular adventure activity especially with younger generations. There are rock climbing facilities already available at Dharkhora and Kolkaz. However this is only a basic course. An advance course can bring in more adventure enthusiasts from India and abroad.

Night Safari
For those who are little more adventurous, there are facilities for night safari, which is worth giving a try. Watchtowers are erected at suitable places to watch the nocturnal activities of the wildlife.

Tribal Tourism Potentials
Off late tribal tourism has caught the interest of the western visitors. They want to have a taste of the lifestyle which is simple yet scientific. Gondwanaland existed even before the Himalayas and the Gonds are said to the oldest inhabitants in India. The other important tribes of this region are Andh, Dhanwar, Koli Mahadeo, Pardhi, Korku and Halba. There are Tribal Museums at Harisal, Simadoh, Gullarghat and Kolkaz. The museums exhibit articles related to tribal lifestyle and articles related to the wildlife of the region. The museum also hoses a nursery aiming at protecting the endangered medicinal plant species. In order to get a feel of the tribal way of life the tourist are given tented accommodation and taken on a visit to the core tribal areas which is still untouched by the modern civilization. It is hard to believe that their way of living hasn’t changed a little in last thousands of years.(Gogte 30.08.03, Lokmat)
Dangers to the ecosystem in Chikhaldara-Melghat Region

This is one of the world’s most important tiger breeding habitats, affording a continuity of around 2,700 sq. km. The forests of Melghat clothe only about four per cent of Vidharba, yet cater to an estimated 30 per cent of the drought prone region’s water requirement. The protection of the entire Melghat area, by bringing the adjoining forest areas of Ambabarwa, Wan and Narnala under Project Tiger control, has been proposed.

But the problems confronting Melghat are as vast as its potential for tiger conservation. In 1994, around 500 sq. km. of the Melghat Wildlife Sanctuary was denotified, as a result of 4,000 malnutrition deaths in tribal villages outside the tiger reserve during the monsoons. The deaths took place in the Dharni and Chikhaldhara areas where the natural foods that were a part of the Korku tribal diet, such as fruits, tubers, crabs and fish were not available as the forests had been destroyed or degraded. Because the whole region is known as 'Melghat', politicians and contractors managed to confuse the issue and were able to push through a lucrative Rs. 90 crore road construction project. Ostensibly to counter malnutrition deaths among tribals in the tiger reserve - where no rise in infant mortality was observed - the project has been a financial bonanza for contractors. In the name of 'connecting' the villages in Melghat, for instance, a 60 lakh bridge was built to a 30-hut village called Pili, less than 500 metres from the tarred main road. A 26 km. road has been built to connect a single village called Kund to the 'outside world' even though the people of Kund have asked to be relocated. Clearly the tax-payers money could have been better used for the forest and the Korkus.

The cutting of wood for fires and quarrying for the roads has devastated the local ecology, leading to massive fires, siltation of water courses. The forest has been opened to people in the guise of labourers, and poaching incidents have risen. The roads have led to a massive increase in poaching since their construction. There are fears that the roads will facilitate the timber mafia and
land grabbers. None of this benefits the tribal communities for whom the roads are supposedly being built as they do not use motorised transport. Two highways running through Melghat already take a heavy toll of wildlife. Proposals to restrict traffic to daylight hours have not been accepted, though with unified control recently being given to the Field Director, some order may be restored to Melghat.

In addition to these problems, two large-scale, destructive, 'developmental' projects have been unleashed on the region. The Chikaldhara Pumped Storage Project, threatens to drown over 100 hectares of forest frequented by tigers and leopards. The construction process involved in a project of such magnitude will also cause considerable disturbance to this fragile area. Though this project has been denied environmental clearance by the Ministry of Environment and Forests' Expert Appraisal Committee for River Valley Projects, efforts to revive the project cannot be ruled out.

The Upper Tapi Stage II project will drown another 244 hectares of Tiger Reserve land and about 6,000 ha. of forest land totally. The reservoir created by the project as well as the irrigation canals will fragment wildlife habitats and affect tiger movement between Maharashtra and Madhya Pradesh.

The Maharashtra Wildlife Advisory Board has agreed to appoint a committee to look into the renotification of the denotified area of the Melghat Sanctuary, but no further progress has been made on this front.

Supported by Sanctuary magazine and other groups, the Nature Conservation Society Amravati has been fighting for Melghat. Kishor Rithe, the coordinator of NCSA, is setting up a Tiger (Habitat) Defence Unit for Melghat.

Being a delicate and fragile ecosystem mass tourism can become a potential threat to the rich biodiversity of Chikhaldara-Melghat.
Constraints

Staff
Of the 185 posts, 17 are vacant. Only two out of the seven Range Forest Officers are trained in wildlife management. The Research Officer (A.C.F.), foresters (23) and forest guards are not specially trained in wildlife management.

Funds
The funds generally reach the Reserve in the last quarter of the financial year.

Infrastructure
Adequate infrastructure facilities exist in the core.

Grazing
No grazing exists in the core area. The remaining area is burdened with grazing pressures of 25,000 to 30,000 livestock heads. However, grazing is intense around the villages and in broad valleys, which are also better habitats for wild herbivores as these are the only sites where water is available.

Fire
There are few incidences (on an average 12 cases per annum) of fire in the core area, affecting 10 per cent of the area. Fires in the buffer and multiple use area of the Reserve are frequent. The grassy tops of the hills (locally called ballas) are prone to fire. The rugged terrain makes fire protection a difficult job. Almost 20 per cent of the area gets burns annually.

Poaching of Fauna and Flora
Poaching is rare in the core. The local people hunt sambar and wild boar. Collection of medicinal plants like safed musli Chlorophyllum tuberosum is also noticed. The easiest method of poaching is to poison water holes. since most animals frequent these. In Melghat the problem of local people poisoning the water holes for meat of peacocks, deer, has assumed serious dimensions. Melghat has lost nearly 12 tigers and leopards in the last two years due to poisoning.
Livestock Population
The livestock population of 22 villages in the buffer zones and that of 39 villages in Multiple Use Area is 30,000, as per census of 2004 (Source: Wildlife Protection Society of India).

Highways
Two State Highways - Paratwada to Burhanpur and Akot to Harisol - pass through the Tiger Reserve. There has been a sudden increase in traffic along the Nagpur-Indore State Highway in the last four years. This is partly due to a reduction in distance (70 km.) after a new bridge has been constructed in Madhya Pradesh and partly due to better maintenance of the road in Maharashtra.

Diseases
Foot and mouth disease has been noticed at times but no epidemic has been recorded.

Weeds
There is a gregarious spread of Lantana camara and Hyptis sauveolens. Lantana is found in almost all the valleys and village surroundings, where constant grazing takes place. However, it is absent on slopes. Lantana and Hyptis have spread to roughly 30 per cent and 20 per cent of the area respectively.

Conflicts
Man - Animal
Tiger prey base in Melghat includes Indian Bison or gaur Bos gaurus, sambar Cervus unicolor, barking deer Muntiacus muntjac, wild boar Sus scrofa, chital Axis axis and chausingha Tetraceros quadricornis. However, gaur and sambar are in low densities. Chital is found only in few pockets and does not contribute much to the prey base. Thus, the domestic cattle substantially contribute towards the prey base, and 400-500 cattle are killed by the tigers and leopards annually. Quite naturally, this is a matter of conflict. Injuries
and killing of human beings by tiger, leopard and sloth bears is another conflict.

Man-Forest

People set fire to the forest and use destructive methods of harvesting gums, honey, fruits, flower, roots, tubers, medicinal plants etc. The local people have almost free access for firewood, small timber, bamboo and grasses. All this dependence is not quantified. Presently the dependence on forest produce is not causing any evident impact on the forest. However alienating the tribals from their livelihood has led to malnutrition deaths. Thus they are up in the arms against the forest officials. Some of the NGOs like the “Melghat Mitra” has made significant contribution in checking such malnutritional death among the tribal children. Eco-development approaches for the future will be vital in creating a harmony between man and forest, in this tiger habitat.

Suggestions

1. Immediate transfer of entire Reserve area along with staff under the administrative control of the Director.
2. Finalisation of legal status of Core and Buffer area as National Park and Wildlife Sanctuary respectively.
3. Establishment of strike force to strengthen protection.
4. Rehabilitation of few villages from buffer on priority.
5. Ecodevelopment in villages in the Multiple Use Area.
7. Staff orientation and training to improve the management capabilities and to provide them adequate essentialities to get their commitment.
8. Building up of research and monitoring database to support conservation activities.
References

Chitale S.K (08.12.03 Lokmat) Durg Bhramanti : Bhuikot Vairagarh

Chowdhury, A.N. Handa, B.K. 1978 Some aspects of the geochemistry of

Directorate of Information and Broadcasting, Lokprabha Monthly Issues

Dupare P. (09.12.02, Lokmat) Sarvadhik Vanasampada Astanahi Paryatanat
Vidarbha Sarbat Maghe

Gadkari Madhurika (08.08.99 Akshar Ranga) Adivasincha Tirthakshetra
Hemalkasha

Gogte (30.08.03, Lokmat) Vidarbhat Nisarga Paryatanacha 321 sthalancha
Vikas Shakya

Government of Maharashtra, Marathi Vishwa Kosh : Ministry of Information
and Broadcasting

Hawkes, H.E. 1967 Geochemical evidence on the origin of the Lonar crater,
78, pp. 1199-1200.

Jhade Vikas (27.03.03, Lokmat vishesh) 09.03, Manthan) Purva Vidarbhatil
Durlakshit Paryatan Sthala

Joshi N.M (22.07.03, Lokmat) Vidarbhachya Paryatanachi Durdasha series
(1 to 30)

Kulkarni Dutta (27.10.02, Janmadhyam) Paryatanacha Samrudha Varsha

Maharashtra tourism Development Corporation, (2002) Brochures

Paryatan Vikasa-sambadhi Tippani

Pawar Vijay (12.01.04, Lokmat) Naisargik Saundaryani Natlele Melghat

Pawar Vijay (19.01.04, Lokmat) Vaidharbhivyanchi Ooty : Chikaldara

Pimpalkhute Prof. Madhav (01.01.03, Deshonnati) Paryatan Udyogatil
Prakashwatk
Raje Vishal, Kondolikar Nitin (14.03.03, Lokmat) Lonar sarovaratun Series
(1 to 10)

Websites:
www.google.co.in
www.lonarcrater.com
www.maharashtratourism.gov.in
www.mapsofindia.com
www.webshots.com
www.vidarbhawani.org