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Is underground Space Utilisation a New Concept for India?

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Abstract: Over the world, the developed cities have been using underground space effectively from the past century, due to rapid urbanization and technological advancement. This scenario is different in developing nations like India, where it is at an infant stage in today's world. A question arises in many of our mind, that whether the underground space use is a new concept for India. The paper demonstrates that the underground space usage is not a new ideology in India rather it has been traditionally used for many years in various forms based on the context of its requirements. Thus this paper tries to assert some of the indigenous usage of underground spaces in the ancient India.
Keywords: Underground, caves, vavs, tunnels, vault

I. INTRODUCTION

The history of underground space utilization reveals that, the space is used for defence, protection, conservation of land and ritual purpose [1]. In the contemporary world its usage has transformed and is mostly prevalent in the core areas of world cities due to the problems created by rapid urbanization [2]. Underground space use approach is one resource, which has been debated for many years in developing nations like India, have now started to emerge in many cities in the form of metro rail, underground parking, shopping, etc. But the usage of underground is not a new concept in India and it has been traditionally used over many years in the form of shelters, religious spaces, infrastructure facilities, tunnels, vaults, etc. This paper tries to exhibit some of the efficient utilisation of underground spaces in ancient India.

II. UNDERGROUND SPACE USE IN ANCIENT INDIA

A. The Bhimbetka Caves, Maharahstra

One of the oldest prehistoric rock shelters is found in the state of Maharashtra called the Bhimbetka caves (Figure 1). These are series of natural caves used by human in different periods, starting as early as 40,000 B.C. that is spread over 20 square kilometres in the Vindhya mountain range. The caves provided shelter for protecting them from harsh climate and animals. The series of caves consists of numerous paintings on the walls, which depicts the life style of the ancient human during different periods of human life [3].

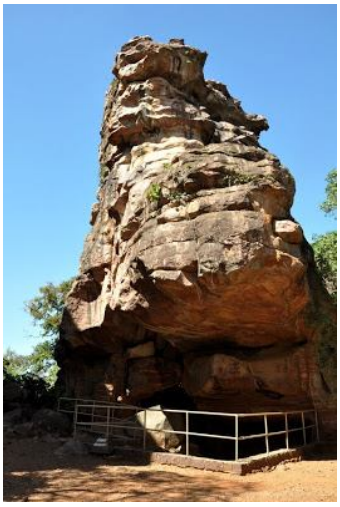
Fig. 1: Bhimbetka Rock Shelters

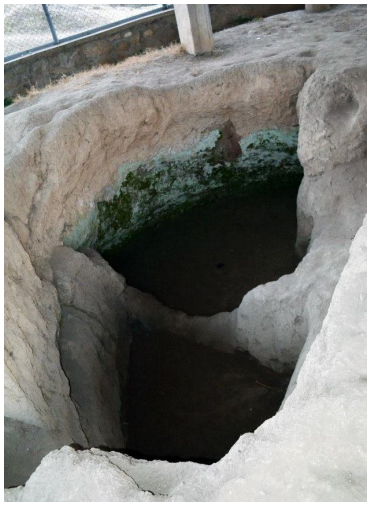
Fig. 2: Shelter Pits in Bhurzahom

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B. Shelter Pits in Bhurzahom, Kashmir

The excavation by Archaeological Survey of India (ASI) in 1960 at Burzhahom in Kashmir revealed one of the earliest examples of manmade underground structures, which was dated more than 5000 years old [4]. The subterranean structure was pits carved below ground into the compacted loess deposits, which is used as houses due to its excellent thermal insulation during severe winter season (Figure 2).

C. Rock Cut Temples Ajanta and Ellora Caves in Aurangabad

One of the ancient marvels of the world was found in the Western Ghats range called the Ajanta and Ellora caves (Figure 3). Numerous intricate rock cut temples are found in the mountain range, since the first century CE. The tunnel of the Ellora alone stretches to a length of 10.8 km. The caves comprises of the Buddhist Viharas, Chaitya halls, monasteries and Hindu temples which are scooped and carved inside the mountain. The famous paintings depicting the life history of Buddha, Jataka tales, etc. are drawn on the walls of the caves is one of the finest examples of art in the world [5]. The most mysterious discovery is the small tunnel shafts, which were found in the floors, are yet to explored and decoded.

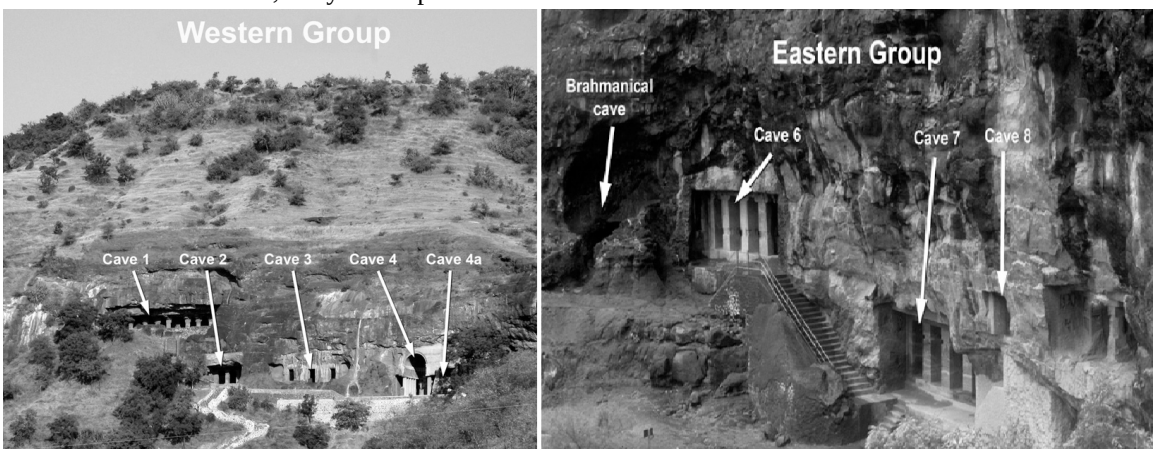

Fig. 3: Ajanta caves, Aurangabad

D. Step Wells, Gujarat

The most amazing architectural creations during the medieval period, was the step wells of India [6][7]. Step wells are underground structures dug deep trenches for water wells reached by stairs or steps called as baoli, vav, kunds, bawdi, kalyani or pushkarni. There are various examples found throughout India and Adalaj is one of the finest found in Gandhi nagar (Figure 4). The step walls are used not only for daily water needs but it was considered to be sacred space. The place was used to socialize and gather for religious ceremonies and virtually as subterranean temples with exquisite carvings and idols of male and female deities.

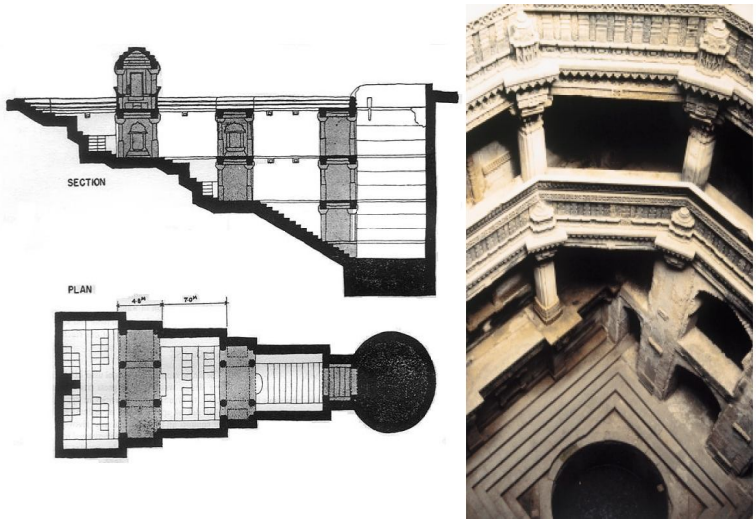

Fig. 4: Adalaj step-well from Gujarat

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E. Tunnels

The mysterious 8 km tunnel named Qutb Shahi connects Charminar and Golconda fort for the safe escape of the imperial family or for secret messages [8] (Figure 6). The Mughals too are masters in tunnel construction, connecting various places like Delhi, Agra and Lahore [9]. The tunnel of Srirangapatna temple is a noteworthy example found in Tamilnadu is a sensational archeological discoveries [10]. The tunnel was used by the members of royal family and their military generals as escape route and also an underground treasure vault (Figure 7).

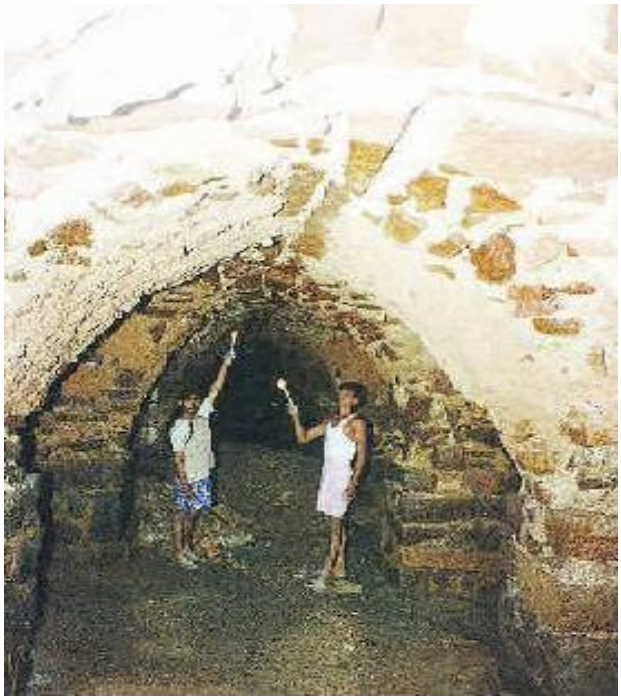

Fig. 6: Qutb Shahi tunnel

The importance of tunnel as source of distribution of water played a major role to the cities of Bijapur [11]. The British writer Henry Cousens quotes his views that the intricately built chains of underground tunnels were primarily used to supply water from artificial lakes and wells to the ancient city (Figure 8).

Fig. 7: Escape Tunnel, Srirangapattinam

Fig. 8: Water distribution tunnel, Bijapur

Underground storage tunnels used as vaults are found in many temples throughout India. One of the finest examples can be found in the Sree Padmanabha Swamy temple at Thiruvanathapuram. The temple is identified to be the richest underground treasure vault found in the world. The vault stores a huge number of gold coins, jewels, gems and as a whole around 200,000 items which yet to be quantified [12].

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III. CONCLUSIONS

The underground space use has transformed its complexity in development in today's needs in the form of transportation, storage, shopping, exhibition, theatres, swimming pools, etc. Thus even though the functional utilization of underground space has changed over the years due to peoples need and technological advancement, the exploration of this hidden space is exploited throughout the human history based on the context of its requirement.

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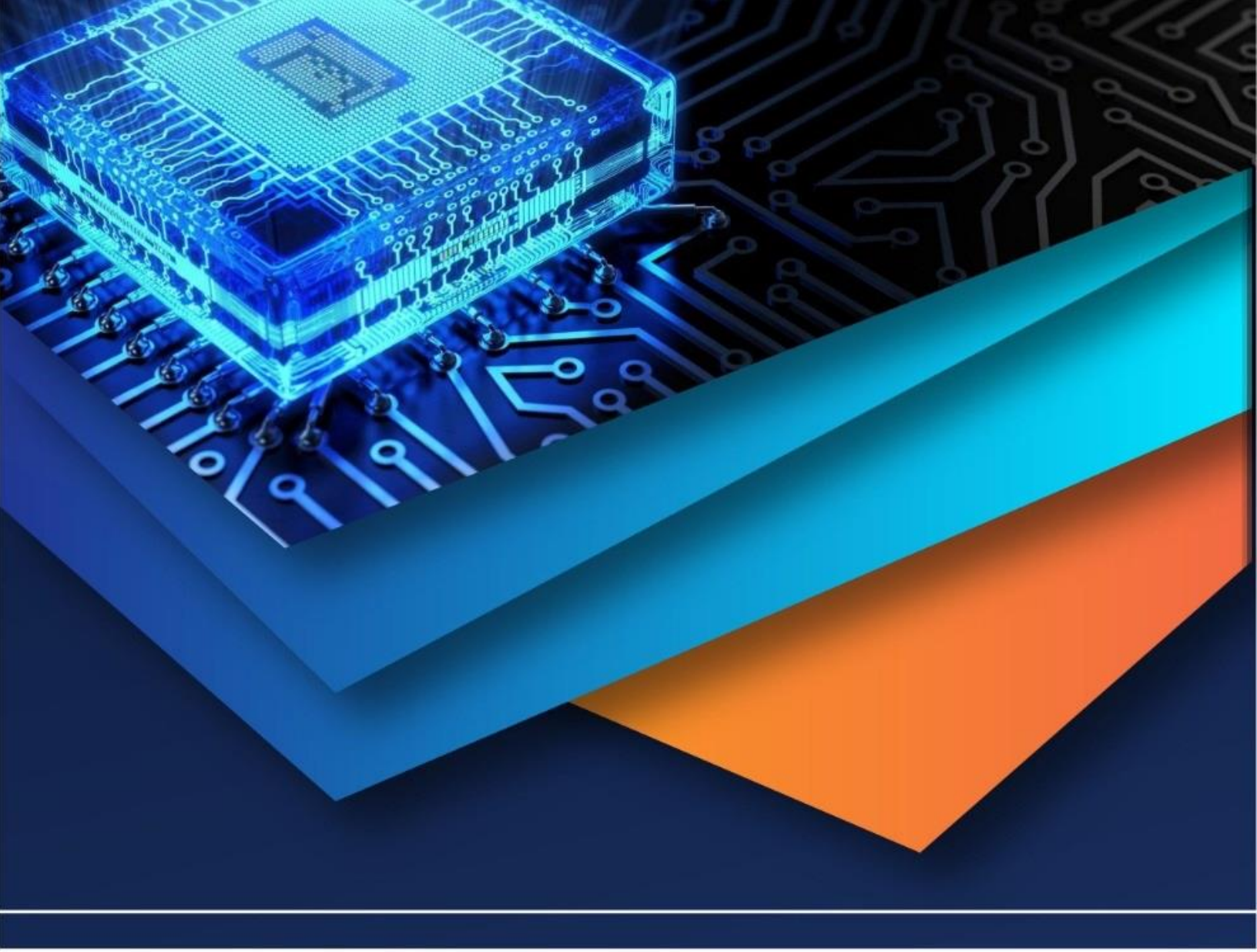

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