



Pancha rathas, the five stone temples of the Mahabalipuram site: opportunity to revive its lost garden heritage through ecotourism

Pancha rathas, os cinco templos de pedra do sítio de Mahabalipuram: oportunidade de reviver sua herança de jardins perdidos por meio do ecoturismo

Pancha rathas, los cinco templos de piedra del sitio Mahabalipuram: oportunidad de revivir su herencia de jardines perdidos a través del ecoturismo

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Abstract

Heritage and landscape development may take place within the heritage assemble procedure. The study presents a case of Stone heritage, characterized by an important intangible Vedic chanting heritage which again linked to the seashore forest and Pallava temple architecture. The purpose is to search diverse physiognomies of what opportunity exists in natural context and its playing role with the built heritage and eco-tourism. The methodology includes an extensive literature review of previous texts and collecting key factors out of those literary and pictorial data for historical evidence proved analysis. The results developed from a scientific approach over such case where ethnology, ancient technology and architectural style might have lost its authenticity and integrity for robust deforestation of associated garden heritage over different courses of time just because of the absence of boundary and buffer zone concept. It revealed three major opportunities for future sustainable accomplishment in this historic site: significance of effective network comprising authorities and stakeholders, over excessive tourism can also be regarded as curse for local landscape because of rapid urbanization and finally ecological bounties, recapture of areas and aggregation need a strong legitimation to justify buffer zone and site boundary from all possible Direction.

Key-Words: Mahabalipuram; Garden heritage; Five Rathas; Pallava architecture; Stone Heritage

Resumo

O patrimônio e o desenvolvimento da paisagem podem ocorrer dentro do procedimento de montagem do patrimônio. O estudo apresenta um caso de patrimônio em pedra, caracterizado por um importante patrimônio intangível do canto védico que, por sua vez, está ligado à floresta litorânea e à arquitetura do templo Pallava. O objetivo é pesquisar diversas fisionomias sobre o que existe de oportunidade no contexto natural e seu papel no patrimônio edificado e no ecoturismo. A metodologia inclui uma extensa revisão da literatura de textos anteriores e coleta de fatores-chave desses dados literários e pictóricos para análise comprovada de evidências históricas. Os resultados foram desenvolvidos a partir de uma abordagem científica sobre o caso em que a etnologia, a tecnologia antiga e o estilo arquitetônico podem ter perdido sua autenticidade e integridade devido ao desmatamento robusto do patrimônio do jardim ao longo de diferentes cursos de tempo devido à ausência do conceito de limite e zona tampão. O estudo revelou três grandes oportunidades para realizações sustentáveis futuras neste local histórico: importância de uma rede eficaz compreendendo autoridades e partes interessadas; o excesso de turismo também pode ser considerado uma maldição para a paisagem local por causa da rápida urbanização e, finalmente, da generosidade ecológica, recuperação de áreas e necessidade de agregação uma forte legitimação para justificar a zona tampão e os limites do local de todas as direções possíveis.

Palavras-chave: Mahabalipuram; jardins tombados; Five Rathas; arquitetura Pallava; Patrimônio em pedra

Resumen

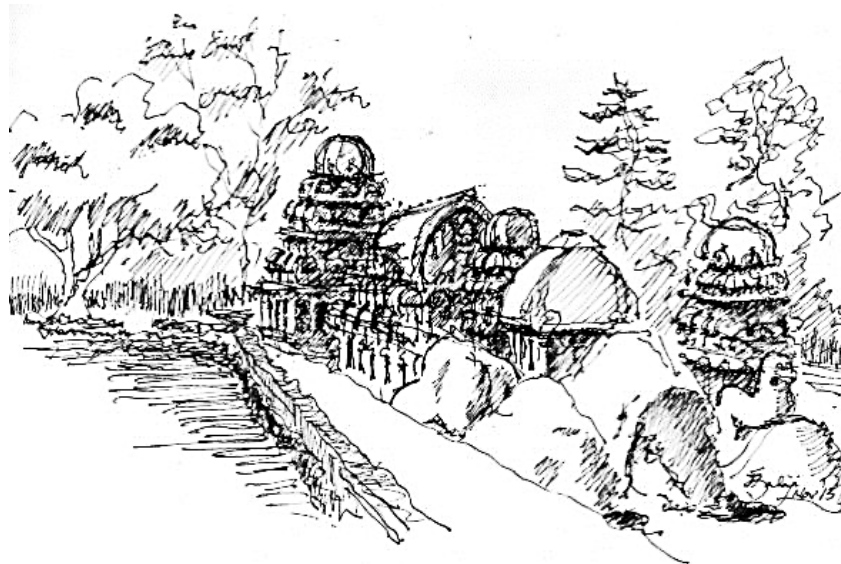
El paisaje y el desarrollo del patrimonio puede tener lugar dentro del procedimiento de montaje del patrimonio. El estudio presenta un caso de patrimonio de piedra, caracterizado por un importante patrimonio intangible de cánticos védicos que se vincula con el bosque a la orilla del mar y la arquitectura del templo de Pallava. El propósito es buscar diversas fisionomías de la oportunidad que existe en el contexto natural y su papel de juego con el patrimonio construido y el ecoturismo. La metodología incluye una revisión extensa de la literatura de textos anteriores y la recopilación de factores clave de esos datos literarios y pictóricos para el análisis probado de evidencia histórica. Los resultados se desarrollaron a partir de un enfoque científico sobre un caso en el que la etnología, la tecnología antigua y el estilo arquitectónico podrían haber perdido su autenticidad e integridad para la deforestación robusta del patrimonio de jardines asociados en diferentes cursos de tiempo solo por la ausencia de un concepto de límite y zona de amortiguamiento. Reveló tres oportunidades importantes para el logro sostenible futuro en este sitio histórico: la importancia de una red efectiva que comprenda a las autoridades y las partes interesadas, el turismo excesivo también puede considerarse una maldición para el paisaje local debido a la rápida urbanización y, finalmente, las recompensas ecológicas, la recuperación de áreas y la necesidad de agregación. una fuerte legitimación para justificar la zona de amortiguamiento y el límite del sitio desde todas las direcciones posibles.

Palabras-clave: Mahabalipuram; jardins; Five Rathas; arquitectura Pallava; Patrimonio em pedra

1. Introdução

Mahabalipuram was established between 7th and 8th centuries during the Pallava Dynasty as a group of sanctuaries with religious purpose; Pancha Rathas are also included into these. King Mamalla and his successors of the Pallava Dynasty have left numerous temples and rock sculptures along the carved on the rock hill, soaring at the rear of the town in Coromandel Coast, which was historically referred as Mamallapuram. The city district was largely developed by the Pallava king Narasimhavarman I during the 7th century AD. After that, a port town facing Bay of Bengal was developed since 1827 under the British occupation. (DONIGER et al., 2010) It is situated near Kancheepuram city, ancient capital of the South Indian State of Tamil Nadu. Today it is nearly 60km south to the capital city Chennai. Traditionally it was a learning center of Jainism and Buddhism. It is also one of the seven pilgrimage sites according to the Vaishnavism sect of Hindu theology. It is called cradle land as important historic cultural sites of medieval architecture in India. Some sites are found like cave temples in rock hills, rock sculptures, rock carved temples, and early stone temples. Among them, a series of unique rock carved temples called 'Pancha (Five) Rathas' which were unearthed in the 19th century, is noteworthy for their variety of architectural forms along with their wall carvings. It was enlisted in UNESCO World Heritage Site in 1985. (Figures 1, 2) these stone temples are the subjects of our study.

Figure 1: Sketch of Pancha (five) Rathas, group of UNESCO world heritage site at Mahabalipuram.

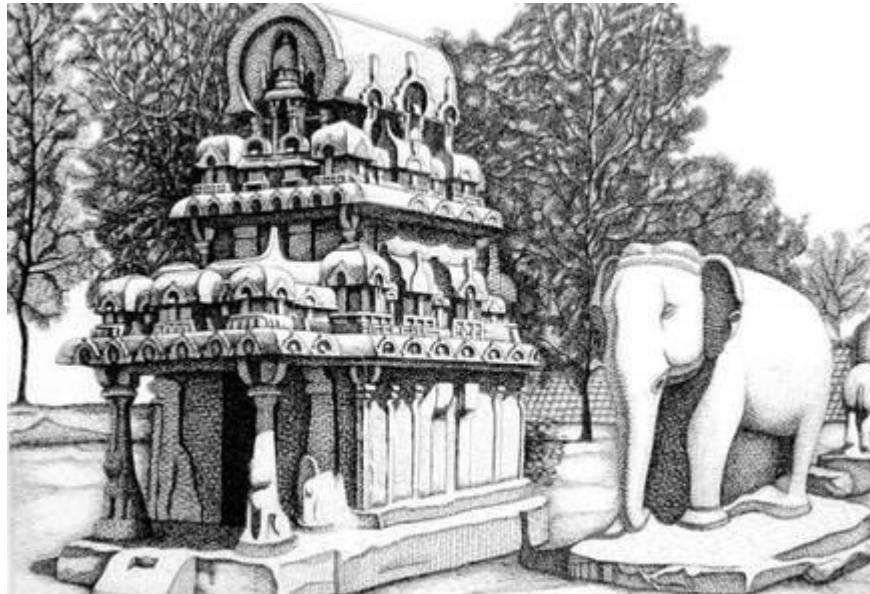


Source: Sketch of Pancha (five) Rathas, group of UNESCO world heritage site at Mahabalipuram.

Selection of study site

The site was chosen carefully because it is not like other Indian temples. These are the miniatures of ideal temple designs and show cases of rock cut masteries. Scholars might argue that what the characterization of these buildings as they are not functional like normally any temple might do. But these were hewn in single Coromandel rocks of sea shores and unique by their appurtenance for south Indian culture. UNESCO inscribed the criterions (i), (ii), (iii) and (iv) to depict its outstanding universal value. The Temples combined all possible Pallava styles in miniature forms. This particular site was selected to enhance its importance as heritage, to make people aware about upcoming climate change effects and bring back the greeneries once that was indispensable part of the whole area. The logic might depend on how cultural landscapes also develop preservation practices in archaeology.

Figure 2: Life size elephant sculpture hewn from stone.



Source: <https://www.thehindu.com/features/metroplus/Read-between-the-lines/article16475077.ece>

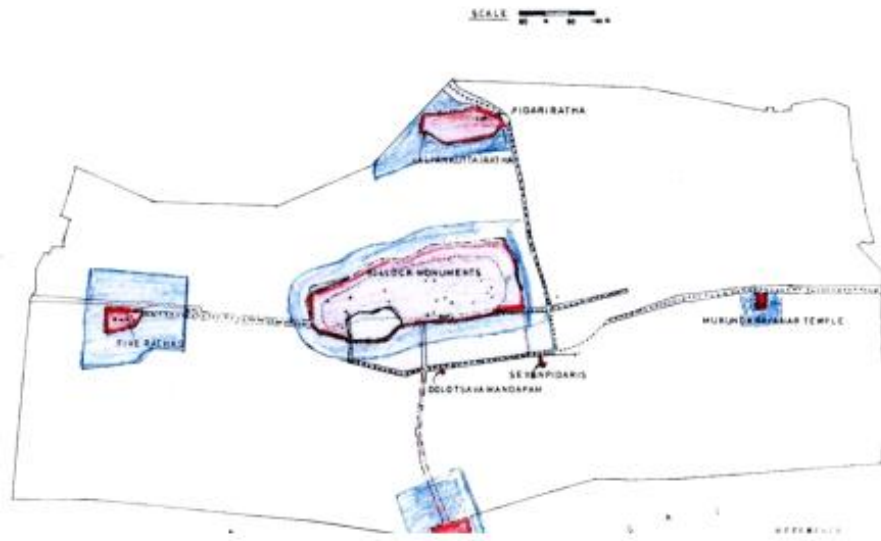
Scope of research

This study might pledge a number of contributions to the existing body of knowledge in heritage research, especially in third world where heritages are facing immense problem due to climate change, vandalism, lack of public awareness, improper conservation technique. From theoretical or academic standpoint, scope of this paper will establish a hypothetical framework that brings aspects like architectural style, economic benefit of heritage preservation, possible opportunities in ecotourism by restoring landscape heritage and supplementation of the community engagement- all under the same umbrella. Meticulous investigation of rare archaeological sites, exploratory research technique in cultural Landscape's garden heritage will pave the way for integrated trends in future. Such research will promote case study based approach towards aforementioned categories or classification. It will also be easy to evaluate World Heritage Sites with additional dimensions: specification, legal management, socioeconomic cognizance and a combined benchmark of conservation practice for cultural landscapes with built heritage forms, which was never done before in this part of the world.

Aims and Objectives of the study:

1. Preservation and conservation overviews of cultural heritage assets in the site.
2. Tapping the significant archaeological values and create awareness among the stakeholders.
3. Subsidiary social development for the benefit of local communities and involving them in bottom-up development. It will be obliging in empowering the rural people.
4. Facilitates market opportunities, especially handicraft industry as productive sectors which will provide opportunity to employ women and disadvantaged groups of surroundings.
5. The region is surrounded by beautiful jungles and so nature lover tourism could also be suggested. It has an excellent potential which is yet to be explored (figure 3).

Figure 3: Map showing Core (red) and Buffer (blue) zones of the Group of Monuments at Mahabalipuram site with five stone temples (Left).

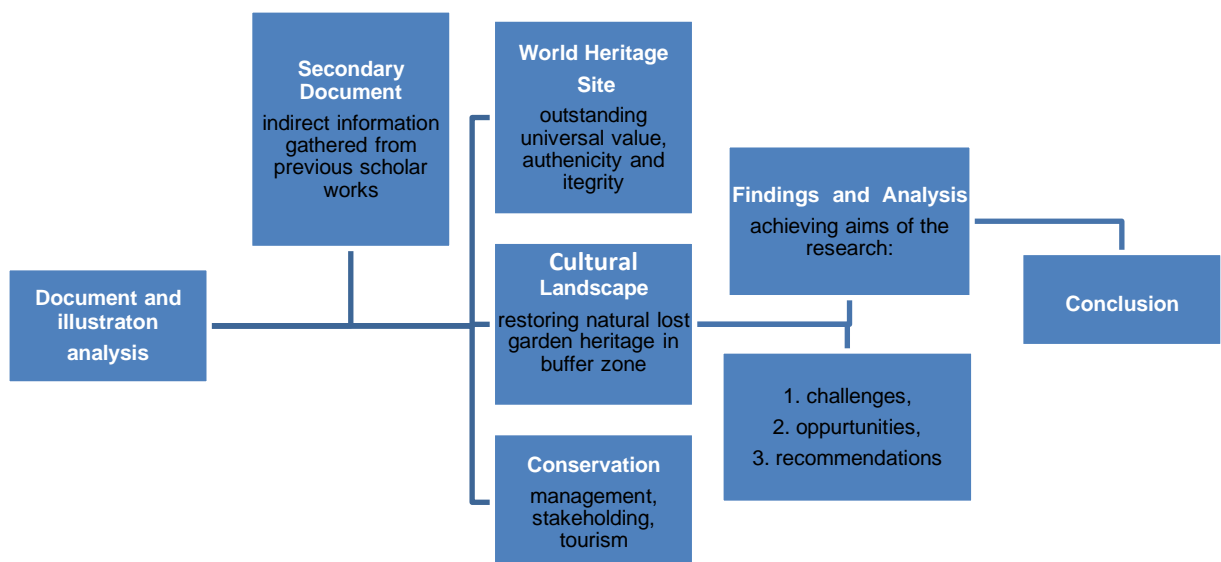


Source: ICOMOS Report. S. I40, May (1984).

Research methodology

This study is based on document analysis which is a form of qualitative research methodology. Data collection focused on secondary sources and congregating information from previous scholarly works. Documents are interpreted around the assessment as those are highly reliable and well- judged. They gave better understanding, perspective and appreciation to identify cultural, architectural and landscape heritage in more detail. These documents are divided into two major sections namely; cultural landscape heritage concept and heterogeneous stone building conservation.

Diagram 1: Conceptual framework of Methodology.



Source: Author.

Analyzing the conceptual framework based on methodology, the categorization of research structure could be developed as follows:

Table 1: Research Structure.

Steps	Objectives	Variables	Mode	Outcomes
1.	To understand the development of the Pallava architecture.	Authenticity and integrity, outstanding universal value.	The ICOMOS criterions (i), (ii), (iii) and (iv).	Findings gathered from the literature review known as secondary sources.
2.	To explain the relationship between lost garden heritage concept and the stone heritage of five stone temples.	UNESCO cultural landscape management guideline.	Cultural Landscape Action Plan, 1993.	Selective acts of guidelines that pursue with the study context.
3.	To examine the relevance of the lost garden concept in response with the ecotourism and World Heritage building preservation techniques together.	Combination of UNESCO heritage nomination guideline and cultural landscape management guideline.	Guidelines, Action plans and Management plans studied under a Heterogeneous character.	Conceptual frameworks on the relationship between two guidelines regarding lost garden heritage and enlisted world heritage buildings.

Source: Author.

Research questions

Main underlying research question of this paper is twofold:

1. 'How can World Heritage Sites like rare stone temples be maintained successfully with all abiding laws of cultural landscape?'
2. 'Without suffering from the negative effects of over-commercialization and over-tourism, how can profitable ecotourism associated with proposed garden heritage might become an important tool to conserve their authenticity and integrity?'

Literature review

First we will concentrate our review for architectural heritage and then we will discuss the possibilities of cultural landscape regain and garden heritage development along with the buffer zone demarcation and range.

1. The Pallava period

Dr. Smith anticipated that "The work begun by the Pallavas was continued by the Cholas and the art of the Chola period was the continuation of that of the Pallava times.' (ABHIYAN, 2017) As the Pallavas were Hindus, the ancient remnants are all Hindu temples and sculptures. Temple architecture under the Pallavas can be seen in four stages:

1. The rock-cut temples introduced by king Mahendravarman I. The earliest examples of the Pallava art are the rock cut temples of the 7th century AD.
2. The second stage of Pallava architecture is the monolithic Rathas and other Mandapas found at group of stone buildings of Mamallapuram / Mahabalipuram site were patronized by king Narasimhavarman I. Here, study of five temples is based on this phase.
3. In the third stage, king Rajasimha introduced the structural temples using the soft sand rocks. The Shore temple at Mamallapuram / Mahabalipuram is the finest example of this. Having a flat roof is the best example of this deviation.

4. The last stage of the Pallava art is very complicated Aparajita style and influenced by other architectural styles by the later Pallavas. The later examples are of structural temples built in 8th and 9th century.

2. The Pancha (five) Rathas: rock cut miniature temples

Though those carved temples are on a relatively small-scale, they show the primary shape of Indian medieval architecture with its tropical placid formation. However, unfinished carved rock temples and cave temples are also not few all around. It gives the impression of a sublime fairyland. It is called the 'Pancha Ratha' (Five carts or carriages); hence a temple or a festival car is just like a vehicle for any God and could be called a Ratha. Five temples and animal sculptures are set in lines like a procession. The architectural styles of the temples imitated the wooden temples of South India of that time. They are precious remains as the 'rock museum' of the architecture of the Pallava Dynasty (MICHELL, 1977).

2.1. Arjuna Ratha: This is devoted to Shiva, is a small structure. It was shaped like a small wooden shrine, once characteristic for Southern India. It is facing towards the east and has two storeys, a small portico and carved pillars. Inside the shrine there are no adornments or it is incomplete inside. But the exterior is very rich with interesting details. The facade had been carved with magnificent sculptures, showing gods and humans side by side. Noticeable is the pair of beautiful Apsaras (divine beauties) with lissome bodies. (Figure 5, 6).

Figure 4: Draupadi Ratha in Lithograph 1914.



Source: Fergusson, J., and Burgess, J. *Great Base Relief in The Cave Temples of India*, London: W. H. W. ALLEN & Co. (1880). Page 155.

2.2. Draupadi Ratha: The closest to the entrance gate and it is also the smallest one. This shrine is shaped like a thatched hut, with a square roof. This Ratha and Arjuna Ratha are on a single platform called upa-pitham. The base is raised and adorned with figures of lions and elephants. This shrine is devoted to goddess Durga and it shows in the amazing artwork. Possibly the best of them is a fine carved panel, which shows Durga on a lotus pedestal. Goddess is surrounded by other characters, including a man which is preparing to cut off his head as a sign of devotion. Outside, above the entrance door, is carved a stylistic sea-monster. On the eastern wall, there is an interesting sculptural

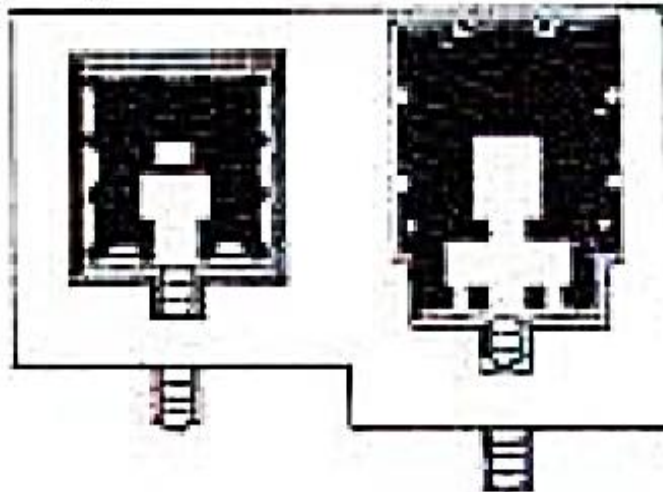
group - Durga standing on a head of Mahishasura (demon). Some sculptures have not been finished. (Figure 4).

Figure 5: Plans of Draupadi Ratha (left) and Arjuna Ratha (right).



Source: Google street view.

Figure 6: Two temples on same base.

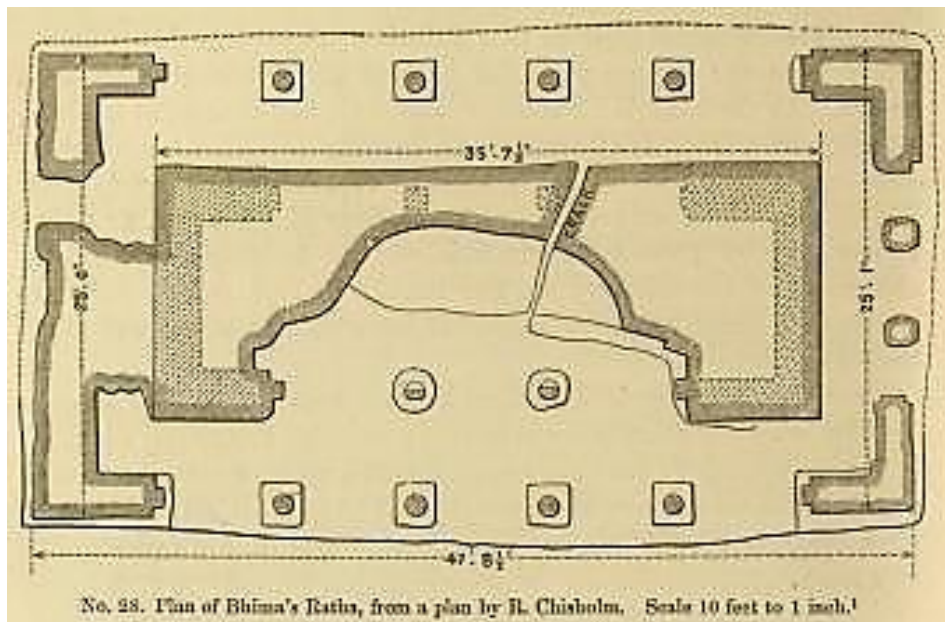


Source: Michell, G. (1977) page. 81.

2.3. Bhima Ratha: The third shrine is the longest of all Rathas - it is 12.8 m long, 7.3 m wide, 7.6 m high. This is Gopura style temple with gabled roof. This Ratha is shaped like a characteristic Vimana (tower above the shrine) of Southern India. Most likely this Ratha was devoted to Anantshayi Vishnu. The larger size of Ratha can be explained by a large base relief of Vishnu in the form of Sayanamurti, which is located inside. It remains unfinished. The sanctuary of this structure has a circumambulatory passage around it. Pillars of the shrine are adorned with figures of lions. This structure was abandoned before the completion but nevertheless it the most magnificent and tallest of all Rathas, with three storeys. The shrine is devoted to Shiva and is adorned with one of the best examples of early Pallava

plastic art with important innovations, for the first time, the Shiva figures on the corners of any structure. (Figure 7).

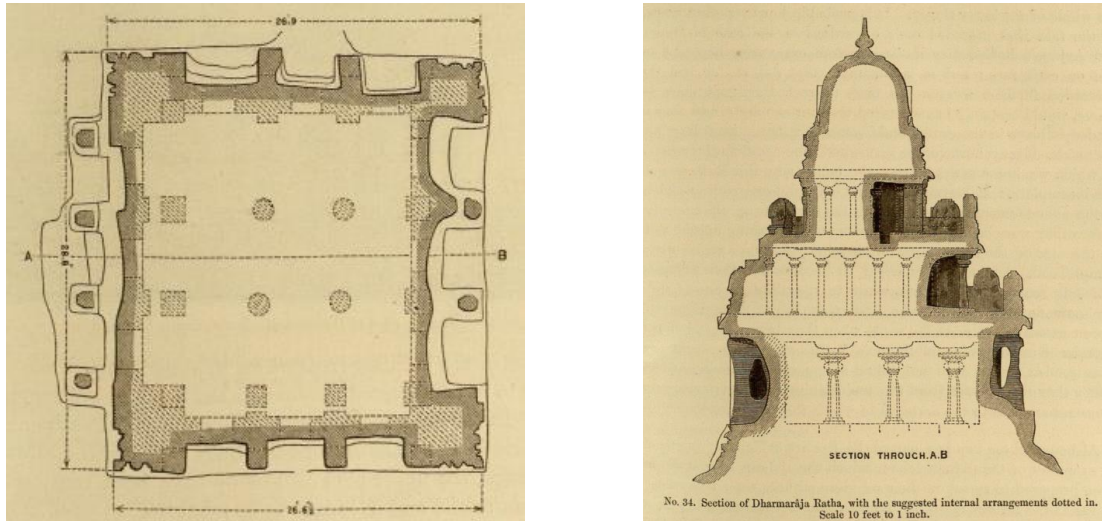
Figure 7: Bhima Ratha, Sketch by R. Chisholm.



Source: Fergusson, J., and Burgess, J. *Great Base Relief In The Cave Temples of India*, London: W. H. ALLEN & Co. (1880). Page 156. (<https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcRymprxXADWffcGpCEE3jaVMB2WS-cfE3WJgg&usqp=CAU>)

2.4. Dharmaraja Ratha: This contains an inscription in Pallava Grantha script, recorded that king Narasimhavarman I built the Dhramaraja Mandapa for the pilgrims who visited this town in 630 AD. Inscription also mentions that this was created as Shiva temple for king Atyantakama Pallava. Columns and pilasters of this Ratha are adorned with lions. The ground floor of Dharmaraja Ratha is completed - it contains eight decorative panels. Especially, an interesting and attractive panel shows Shiva reincarnation of Ardhanariswara - half man, half women. Small premises have been hewn in the other two floors of the Ratha as well. There are no stairs leading to the second floor, but the second and third floors are connected with stairs. This shrine is devoted to Indra and is associated with elephants. This Ratha is the only one which is not placed in a "procession", it stands aside. It is also the only one with entrance facing the south. This Ratha represents an apsidal Vimana that is horseshoe-shaped shrine and it is almost completed. The roof of this shrine is shaped like a back of elephant. One wall of this Ratha is adorned with a relief sculpture of Ardhanariswara, columns and pillars are adorned with seated lions. (Figures 8, 9).

Figure 8 and 9: Plan and section of Dharmaraja Ratha drawn by R. Chisholm.

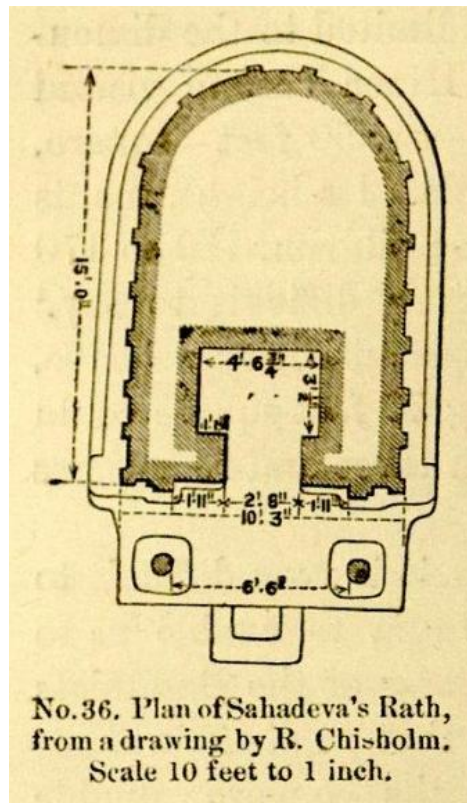


Source: Fergusson, J., and Burgess, J. *Great Base Relief in The Cave Temples of India*, London: W. H. ALLEN & Co. (1880). Page 157. (<https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcS6UOOLauKqEYRJJNFPRa24K-S20N-cvVo6ew&usqp=CAU>)

2.5. Nakula Sahadeva Ratha

It was the earliest Facade of the Pancha Pandava Mandapa which dates from 7th century. A peculiarity of the Nakula Sahadev Ratha is that its shape is of the Gajaprishta (elephant back) pattern. (Figures 10).

Figure 10: Plan of Nakula Shaha Deva Ratha, drawn by R. Chisholm.



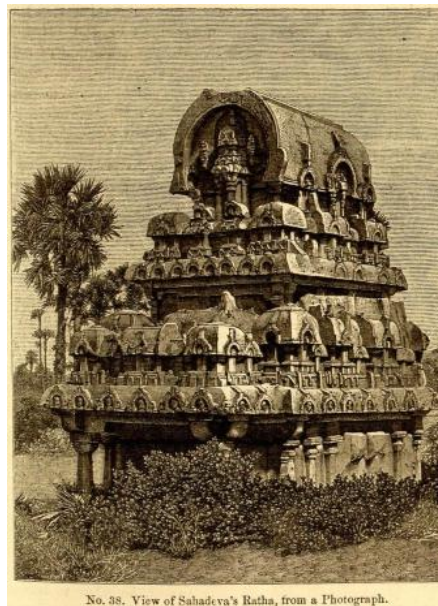
Source: Fergusson, J. and Burgess, J. *Great Base Relief in The Cave Temples of India*, London: W. H. ALLEN & Co. (1880). Page 158. (<https://encrypted-tbn0.gstatic.com/images?q=tbn%3AANd9GcQnqjGVXOIV6qUacY26dgoVMzMXqle--OfVA&usqp=CAU>)

3. Architectural characteristics

Pancha Ratha signifies five different styles of temple architecture in the same complex but in miniature form. These temples are built in the Deula style of planning that has four distinct components: Vimana

(structure containing the sanctum), Jagamohana (assembly hall), Natamandira (festival hall) and Vhoga-mandapa (hall of offerings), each increasing in the height to its predecessor. Each cave temple has a Garbhagriha (sanctuary) and a Mandapa (worship hall), on the walls of which are sculpted relief panels, which are the best representative art of the Pallava Dynasty. The northernmost Draupadi Ratha is carved in a pyramidal roof type, the Nakula Sahadeva Ratha is in a horseshoe chyaitya type, (Figure 11) the Arjuna Ratha and Darmaraja Ratha are in the Vimana type of the southern style and Bhima Ratha is in a Gopura type with a gabled roof. Except the Draupadi Ratha, the upper part of each Ratha takes a stepped pyramidal shape in the southern style. Each horizontal step consists of miniature shrines and Chaitya windows. The southern style Vimanas are surmounted with hemispherical crowning stones, called 'Shikhara' in Northern India. Early stone temple towers are in the southern style and they piled horizontal steps in a pyramidal form. Every Ratha has columns and pilasters on the ground floor. Gods or kings are carved in niches framed with the pilasters. The Garbhagriha (sanctuary) of every Ratha is simple and narrow. These groups of temples resembled basically the vernacular huts. For example, one-storey and square cell surmounted by an overhanging, curvilinear roof is the suggestive shape for Bengal huts. Rathas carved from the granolithic outcrops on the shore. The roofs have ornamentation in finials on the top, indicative of its religious functional nature. The features of the five Rathas have been forerunners or templates for the development of Indian temple monolith temple.

Figure 11: Nakula Sahadeva ratha, Lithograph in 1914.



Source: Fergusson, J., and Burgess, J. *Great Bas-Relief in The Cave Temples of India*, page 159. London: W. H. ALLEN & Co. (1880).

4. The Pallava architectural features

1. The transition of wood to stone was effected in northern India during the reign of Ashoka in the 3rd Century BC; it took one thousand years more to introduce in southern India under the Pallavas.
2. Features show the transition from the Rock Cut Architecture to the Stone built temples.
3. The rock cut reliefs of the Pallavas are the earliest surviving royal portraits after the Kushana images.
4. Their columns were thick and square at the outset, but gradually became more slender.
5. Lion was the insignia of the Pallava dynasty thus such column base became characteristic feature. Lions sculpted in standing posture on columns in later ages, but in Mahabalipuram, they still take a squatting pose. For example, crouching lion carved at the base of a column in

Ramanuja Cave, nearby. In later South Indian temples, lions on columns standing dynamically. (Figure 12)

6. The icons of large human Dwarapalas on either side of entrance later became a characteristic of almost all South Indian temples. Introduction of such human figures at the base, shaft and capital of pillars became distinct specialty for early Pallava architecture.

7. Very refined stone-cutting and engraving.

8. The roof in pyramidal progression achieved by three storeys.

9. Another distinguishing feature of the Pallava style of architecture is perceived in the Gavaksha motif of Chaitya arches framing busts of deities that crown the entablature. Chaitya window of Buddhist art was the only influential foreign element introduced.

10. The monuments are mostly rock-cut and monolithic, and constitute the early stages of Dravidian architecture where in Buddhist elements of design are prominently visible. They are constituted by cave temples, monolithic Rathas (chariots), sculpted reliefs and structural temples. The pillars are of the Dravidian order.

Figure 12: Lion base at Bhima Ratha, Sketch by R. Chisholm.



Source: Fergusson, J., and Burgess, J. Great Base Relief in The Cave Temples of India, page 159. London: W. H. ALLEN & Co. (1880).



5. Outstanding universal value

The selection of these five stone temples was considered by 4 criterions:

- (i) To represent a masterpiece of human creative genius;
- (ii) To exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;
- (iii) To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared
- (iv) To being an outstanding example of a type of building, architectural or technological ensemble or landscape this illustrates significant stage in human history. (<https://whc.unesco.org/en/criteria>)

We have to describe briefly about all the Groups of Mahabalipuram monuments, as they are unique creations of Pallava art. As for the first time in the history of Tamil Nadu, an attempt was made to deviate from the traditional way of construction of monuments i.e. use of wood, brick etc. The ultimate origin of these forms traces back to wood construction, but opinions differ about whether their direct antecedents were secular or sacred, wooden or stone buildings. It is likely, due to the advanced design of the Mahabalipuram/Mamallapuram shrines, that temple building had previously undergone a substantial process of development, and that the shrines mark a rapid transition from the earlier wooden temples to later structural monuments in stone. (MOFFETT et al, 2003) King Narasimhavarman I's successor, king Rajasimhavarman later shifted his interest from rock-cut architecture to structural building. (AYYAR, 1982) All the archaeological sites here are veritable experimental laboratory depicting the various phases and development of South Indian architecture like cave temples, monoliths, bas-relief and structural temples are hewn from the granite rock face. The natural landscape was utilized in carving out these structures and it is universally known as Pallava craftsmanship. Art historian Percy Brown traces the possible roots of the Pallava Mandapa to the similar rock-cut caves of Ajanta and Ellora. Referring to king Narasimhavarman's victory in 642 AD over the Chalukyan king Pulakesin II, scholar like Brown says the Pallava king may have brought the sculptors and artisans back to Kanchi and Mahabalipuram as 'spoils of war'. Whole Mahabalipuram region is culturally so resonant that it absorbs and disseminates all other influences. All but one of the Rathas from the first phase of Pallava architecture is modeled on the Buddhist Viharas or monasteries' style. Such style shown Chaitya halls with several cells arranged around a courtyard. (HOWES, 2009) Moreover, Rock relief on a sculpted cliff has an image of Shiva and a shrine dedicated to Vishnu, indicating the growing importance of these Sangam period deities and a weakening of the roles of Vedic gods such as Indra and Soma. The inclusion of Adivaraha Cave as extension will give more weight to monuments since it contains life size cultural representation of the ruler who created all these monuments. Besides it contains invaluable Pallava inscriptions also. (<https://www.speakingtree.in/blog/temple-architecture-different-stylesii>)

6. Integrity and authenticity

Historic integrity of any archeological site is the composite of seven qualities: Location, Design, Setting, Materials, Workmanship, Appearance and Association. As a seaport, Mahabalipuram region, where Pancha Ratha is situated; was center for trade and also preaching post for Buddhist scholars. It had influence over Buddhist architecture in Combodia and Malaysia. The social-political content was to distinguish the Pallava dynasty from Chola (Dravidian). It is the first example of how Khajoraho carving cave can become free standing temples of stone. The rocky hill, sand and sea all the site forces were suitable to erect such kind of edifice. (FERGUSON, 1880) The site gives the delightful impression of a city of life-size model buildings, whose variety of roofs, floor plans, and columniation defines a veritable source of South Indian temple forms.

6.1. Onomastics of greater region

According to local guides, the site's name changed during the centuries. The first name was Kaṭalmalai meaning 'land between the mountain and the sea' in Tamil. The second name was Māmāllāpuram meaning 'land of king Mamalla' as the region was ruled by this particular Pallavan King. For sure, Pallava king Mamalla was first to employ workers in 7th century to build a port city and thus the city was named as Mamallapuram. The third name was and is still there is Mahabalipuram meaning 'land of warrior'. It is attributed after the death of king Narasimhavarman I in 668 AD. According to legends, he was the grandson of the devoted Prahlada. (SUNDARESH, et al 2004) It is also known by several other names such as Mamallapattana and Mamallapuram. Another name by which Mahabalipuram has been known to mariners, at least since Marco Polo's time; is "Seven Pagodas" alluding to the Seven Pagodas that stood on the shore, of which only one 'Shore Temple' is still surviving.

Figure 13: Roman coins of Theodosius I from 4th century.

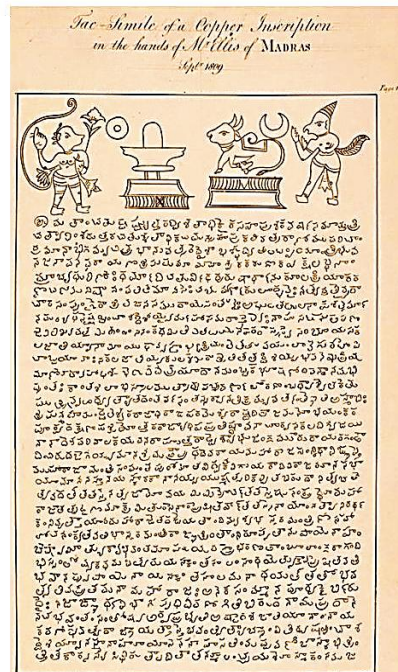


Source: (<https://www.colleconline.com/en/items/90993/coin-ancient-roman-theodosius-i>).

6.2. Textual evidence of site

Mahabalipuram is an ancient historic town and was a bustling seaport as Periplus (1st century CE) and Ptolemy (140 CE) described during their visit. Ancient Tamil texts do not directly mention its location. Even the Vedic epic name associated with the Pandavas is not supported by history. Again, Perumpanarrupatai, a Sangam age poem and the oldest Tamil poetic texts of 500 lines, a work from 100 BC – 100 AD described the rule of King Thondaiman Ilam Thiraiyar at Kanchipuram of the Tondai Nadu where it inscribed a port called Nirppeyarvu. Scholars identified that port as present-day town's earliest location. Later, the 8th-century Tamil text written by Thirumangai Alvar described this place as Sea Mountain "*where the ships rode at anchor bent to the point of breaking laden as they were with wealth, big trunked elephants and gems of nine varieties in heaps*". (CHARI, 1997) (Figure 14)

Figure 14: Alvar manuscript, Tamil text of Sangam period in copper plate.



Source: shutterstock.com

6.3. Biographic evidence

During the early 1st century A.D, The port was mentioned as Malange by the Greek historian Ptolemy. Ptolemy indicates a seaport of water silk road in south India. (STEIN, 1960) After that, Marco Polo was one of the earliest European visitors to this region. But he left few details of his visit and marked it on his Catalan Map of 1275. (NAGASWAMY, 2010) John Goldingham, an English astronomer, living in Madras (today's Chennai province) wrote an article for his visit and the legend of seven pagodas in 1798. Orientalism in English poetry was introduced by poet Robert Southey, who mentioned this region in his poem as 'The Curse of Kehama' in 1810. (STEIN, 1960) During the time period of 1799-1803, the British govt. appointed experienced antiquarians such as Colin Mackenzie for excavation in this site. Such archaeological evidences were Recollected by Mark William Carr in his book 'Descriptive and Historical Papers Relating to the Seven Pagodas on the Coromandel Coast' in 1869. According to essay published in 1914, J.W. Coombes believed these pagodas once stood on the edge of the shore, and their copper domes reflected sunlight and served as a nautical landmark. (GROUT, 1995).

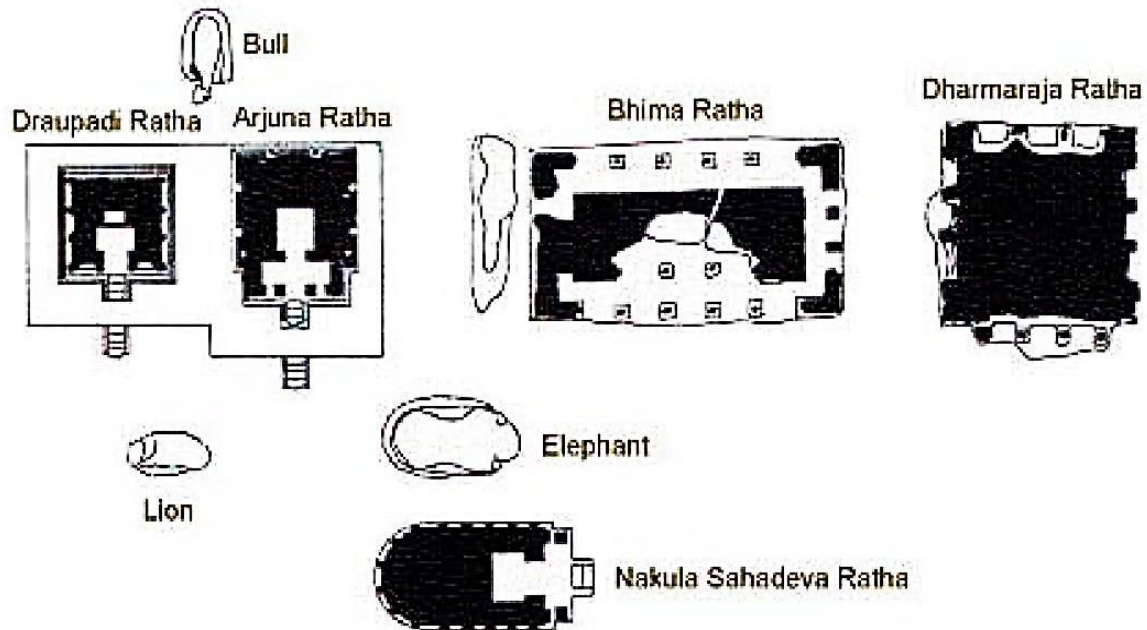
6.4. Archaeological evidence

Megalithic burial urn, cairn circles and jars with burials dating to the very dawn of the Christian era have been discovered near Mahabalipuram port. (CHATTOPADHYAYA, 2009) Chinese coins and Roman coins of Theodosius I from 4th century have been found at this region revealing the port as an active hub of global trade in the late classical period. Two Pallava coins, Srihari and Srinidhi have been found as well. Thus scholars perceive that Pallava kings ruled Mahabalipuram port from Kanchipuram; the capital of the Pallava dynasty from the 3rd century to 9th century CE, and used the port to launch trade and diplomatic missions to Sri Lanka and Southeast Asia. (SINHA, 1979) (Figure 13)

6.5. Construction technique - development of construction method

Centuries after centuries, they carved series of more than ten freestanding rock temples at an exposed, elongated and independent rock hill, one continuous underground rock in a sandy place; lying about 400m from the coast. (Figure 15) Carving must have required hundreds of highly skilled sculptors. A stone of 4 feet height may take about 60 days to carve. (PARKER, 2001) The overall construction method is comprised of three phases:

Figure 15: Overall plan of Pancha (five) Rathas.



Plan of the Pancha Rathas

Source: Arts in Hindu Monuments of India, Mitchell, G. (1977) page. 81. (<https://www.salentoacolory.it/le-meraviglie-pancha-rathas-india/>).

(i) First phase

The temple was built using a measure of $13/8$ inch called an ANGULA. (24 units of ANGULA equal to 33 inches and called a HASTA). (<https://www.wisdomlib.org/definition/angula>) All the monolithic Rathas are hewn out of the hillocks or mounds of the Charnockite and carved out of a single piece of granite in situ. First, they rivet a series of holes, 1 inch wide and 2 inch deep each. After that they place a wooden wedge and hammer in each of the holes. Then, they pour hot water into them so that wood would start expanding inside the rock. The rock then completely split into two halves and one of them was transported to any temple site for sculpting pillars and the rest half is carved into a temple. (SUNDARESCH, 2004).

(ii) Second phase

Now they made rectangular pattern on the smooth side of the rock with desired Measurements. The size of the sculpture going to be created is determined by this pattern. Once this is done, the unwanted rectangles would be removed by chiseling away. The next step is called battoning, a common technique for stone carving known since prehistoric times. (<https://frontline.thehindu.com/arts-and-culture/heritage/temples-by-the-sea/article9604415.ece>)

(iii) Third phase

Carving of figures on this raised platform needs meticulous and precise artistic skill. After selecting the right size and texture of stone, sculptors draw a rough sketch on it. Then they cut around it with chisel and hammer. After that they smooth the idols with a special set of chisels. The finer details like ornaments, facial features are carved out with another set of smaller chisels. First, those were Sculpted on local granite and then used as stone-pillars. These pillars hauled from a nearby quarry and some details were carved out of black basalt stone in relief also at site. (KAMIYA, 1997).



convention guidelines. The study site, Pancha Ratha could be developed according to the 3rd criteria, namely; Associative cultural landscape and historical drawings. (www.icomos.org/landscapes/index2enl.htm) (Figure 17, 18).

i) Designed cultural landscape: The most easily identifiable is the clearly defined landscape designed and created intentionally by man. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.

ii) Organically evolved cultural landscape: This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:

- A relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.

- A continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.

iii) Associative cultural landscape: The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. (https://whc.unesco.org/documents/publi_wh_papers_07_en.pdf) Later, at International Expert Meeting on 'Cultural Landscapes of Outstanding Universal Value' in Schorfheide in Germany in 1993 prepared an Action Plan for the Future where it adopted the value, "*An exchange of information, case studies and management experiences on the level of regional and local communities for the protection of cultural landscapes between State Parties*". (<https://whc.unesco.org/archive/repcom93.htm>)

Figure 17 and 18: Site boundary and buffer zone, all around a garden could be possible to bring back landscape heritage.



Source: drawing by author over Google Earth image, taken on 23rd of June, 2016.

Results and analysis

a) Tourism as an Economic Factor: To be profitable, natural sites have to be aware of their history and understand themselves as service providers on the long run. Service orientated tourism and authenticity are not in a contradiction. Especially authenticity is a moving factor for visitors coming to Mahabalipuram region, especially Pancha Ratha. The visitors expect a certain ambiance, kept in good shape, maintained well, as it was once historically evident for Mackenzie's map. (Figures 19, 20, 21) For that sound volunteering network could be trained to assist regular employees and trained staffs are needed. Only need to be careful that masses of tourism must not destroy the site. Precise recommendations depend vitally on local and regional economy and also need to be reviewed regular basis.

b) Congestion management and control of visitor flow: In order to not endanger the site or put the authentic experience at risk, a carrying capacity should be set up. It also means that in cases of emergencies this set amount of visitors can be evacuated safely. For example, during peak seasons, every four minutes only pre-booked groups will be allowed to enter. It is then known how many people are inside per hour, which is approximately the duration of one tour through the whole site. Depending on the size of the group, the system automatically calculates how many individual tourists can enter



without surpassing the carrying capacity. This kind of shift, from seeing tourists as a threat to embracing the opportunities will pave the most successful way for future management.

c) Involvement of stakeholders: A good transport system is mandatory to bring the tourists faster to the site on schedule. Tourists want the possibility to buy locally produced products and other souvenirs. They want to taste local foods as well. For that infrastructures need to be improved. Local residents, businessmen and community councils play a vital role for successful management and marketing of any natural site. If they oppose certain plans and strategies or even are excluded from the decision making process, they will not support the management plan and implementation of the management strategies will be difficult. The States Parties should follow and try to implement the assuming management plan based on those criteria of the World Heritage Convention. The State Party should include landscape architects as specialist on the staff. He should be qualified in the history of art and history in general, so that architectural conservation activities can be coordinated on-site. To carry out future works or change of functions is a subject of approval from the local authorities and stock holders. Co-operation between responsible local, regional, national and international development actors will integrate planning, financial funding and monitoring activities.

d) Protection and management requirements: Land use, zoning and development policies for garden heritage could be established by a statutory Master Plan prepared under the Planning Act. This might include sustainability; integration, territorial continuity, cultural identity and an image requalification of the lost landscape heritage. Such Master Plan demonstrates provisions for additional new developments within the natural settings and controlled guidance to check conservation principles. 'Landed Housing Zone' could be applied to the proposed extended buffer zone which should generally maintain low-rise and low density developments. An over-arching framework can ensure effective conservation technique which should be able to guide for over a 40- 50 year period with its strategic planning.

e) Interpretation at the site: Built in a perfect communion between human activity and the natural environment, Pancha Ratha can serve as an example for landscape regeneration for tourism and possible transmission of Outstanding Universal Value (OUV) and their attributes. These have to be concerned about the recognition, identification, protection and management from specific thematic or regional context. So, audio guide and interpretation in various languages contribute to visitor flow than any longer version video guide. Touchpads for physically challenged people can be also provided. Visitors should fill out a questionnaire and leave comments and suggestions for improvement after their visit.

Challenges

Climate change became a great challenge for seashore world heritage sites all around the world for the rise of sea level. Fortunately, Archaeological Survey of India (ASI) has constructed break-water wall all around the sea shore to save the temple from further damage. The temple structures, affected by rough Sea tide and winds with salt content are being conserved by the ASI by building protective groins, treatment with wall paper pulp to absorb the saline water. In addition, chemical treatment is also given over the monument to prevent water seepage into the rock. This kind of treatment is also reported to take out water stored inside the rock thus allowing the stone to breathe and preserve its strength. But contemporary concepts for dealing with climate change for landscape and forest agriculture is not developed in cooperation with specialist institutes that might work on climate and environmental issues. The micro-climatic weather data, especially for the historic site range is not launched by the weather and environment office of Tamilnadu state yet, regarding the alarming climatic issues. Observing the climate changes in the historic landscape and the impact they are having are also not in regular check. The vulnerability of coastal catastrophe, vandalism and deforestation will make the problem more complex in future.

Figure 19: Garden heritage evidence in early 1800's: Map by Colin McKenzie in 1808.



Source: Howes, (2002). Page. 53.

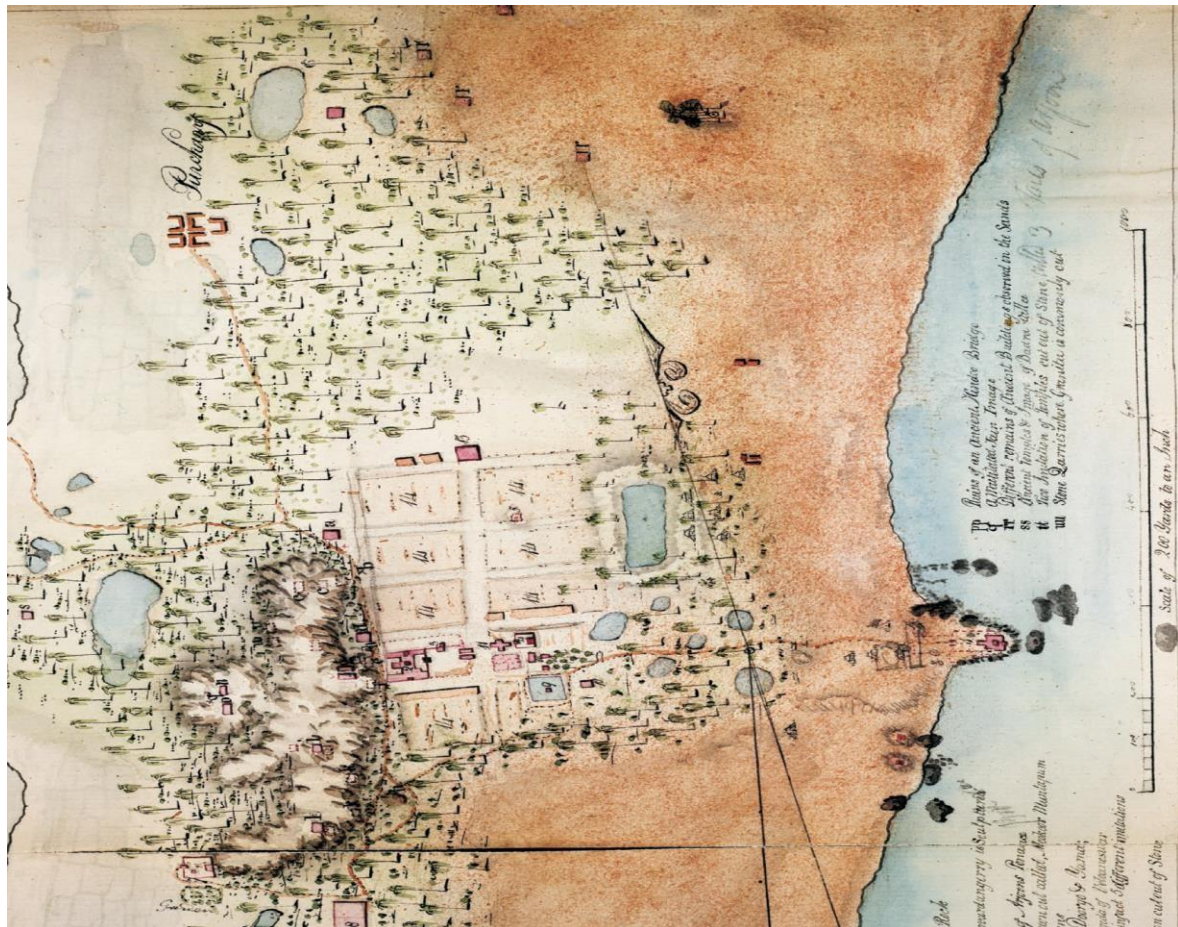
Figure 20: Colin Mckenzie, surveyor of Mahabalipuram, East India Company 1808-1816.



Colin McKenzie Surveyor

Source: British Museum

Figure 21: Lost Garden Heritage evidence in site, Archaeological Survey of British government at Mahabalipuram in 1816.



Source: Howes, (2002). Page 54.

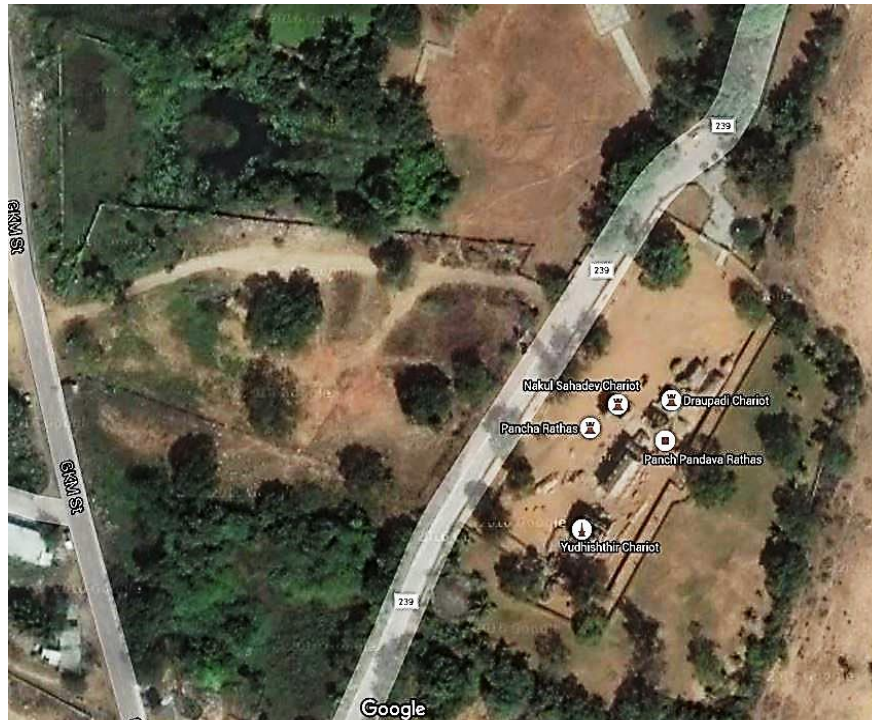
(https://upload.wikimedia.org/wikipedia/commons/c/cc/1808_map_of_Mahabalipuram%2C_Colin_Mackenzie_collection.png).

Opportunities

As it is discussed earlier that the UNESCO implied 4 criterions over all these sites, the criteria (iv) ensures Mahabalipuram as outstanding example of landscape that illustrates significant stage in human history. This analysis will construct the outcomes of this study regarding Site boundaries and buffer zone. The demarcation line and buffer zone are adequate but not interlinked as it was in the past. Archaeological excavations pushed the significance of the landscape property and added additional standards due to unearthing imperishable evidence as a port city amongst forest datable to 1st -2nd Century A.D. As a site, Pancha Ratha at Mahabalipuram archaeological site is in the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished. Here the geographical location itself possesses historic, cultural, or archeological value regardless of the value of any sustaining structure on it. But in Third world countries, this concept is still absent totally. The forest site in rear could be considered as a contributing site, because of three reasons. (Figures 22) Firstly, it was present during the initial period of significance. Secondly, it relates to the documented significance of the property and finally, it possesses historic integrity and is capable of yielding important information about each period. That's why, landscape or open space adds to the significance or setting of the property. Presence of any archeological resources might yield important information related to paleo-environmental data as well. Here, 'Data Categories' for historic and principal exterior materials of the property is stone, created on site and some were carried out. There is no subcategory for foundation, walls and roof of those superstructures and they germinated from this topography. It had always been nourished by historic sources, potential information yielded and possible contribution. Geographical and topographical

features such as valleys, vistas, mountains, and water bodies convey a sense of cohesiveness or give any district its distinct rural or natural characteristics just like a cohesive unit.

Figure 22: Existing buffer zone, outskirts of heritage site where lost garden heritage can be reintroduced.



Source: Google Earth.

The case of this study could be the perfect example. These Pancha Rathas are top most relics with dwindling greens in its periphery, thus if landscaping starts here then it would be easier to grab all the sites and buffer zones to bring the lost garden heritage through different phases of development, to bring back the originality (Figures 23, 24).

Figure 23: Unknown photography in 19th century showing lost greeneries around Pancha Rathas.



Source: British Library, no. (27/ (64). (<https://www.google.com.scroll.in/article/817521/why-arjunas-massive-chariot-in-mahabalipuram-suddenly-got-named-after-ganesha>).

Figure 14: A painting on 23 July, 1816; shows Lost Garden Heritage.



Source: Unknown painter. British Library. No. WD2625. (<https://www.google.com.scroll.in/article/817521/why-arjunas-massive-chariot-in-mahabalipuram-suddenly-got-named-after-ganesha>)

The largest proportion of the cultural landscape areas has long-term, sustained use in the form of agriculture and forestry. The maintenance of cultural landscapes comprising open areas not used for agriculture is considerably more difficult. This can generally only be achieved with the aid of grants from the State, the Federal Government, and UNESCO. (STABAUER et al., 2014) But all authorities should take concern, because without regular maintenance and care; the character of the adjacent habitat and consequently of its appearance will become perverted. Protective measures could be taken regarding the interests of local farmers with large areas of arable land around historic sites. Preserving or reproducing elements that divide the cultural landscape, such as rows of trees or copses, must reconcile overall appearance of natural green spaces. Rural land consolidation procedures and measurements for funding an environmentally sound landscape should be adopted. Despite shortages of budget resources, this can be carried out on a sustained basis by farmers and non-profit organizations.

Recommendations

Based on the results and analysis above, below recommendations could be made it:

1. The foremost site boundaries should be revised and brought into a single landscape planning. A detailed master plan will make the buffer zone more prominent in order to provide facilities and safeguard the property from environmental hazards. Fortunately, the horticulture wing of the ASI has created a green lawn of 11 acres (4.4 hectares) around the Shore Temple. (Red area in Figure 17) We recommend 100 meter core buffer zone around relics toward the sea (yellow area in Figure 18). Then outer periphery of 200 to 400 meter on the west and south could be possible for acquisition of land by planting local flora. (Green area in Figure 18)
2. Plantation of Casurina or Australian pine trees, *Casuarina equisetifolia*, along the affected coast line will protect the relics from soil eruption hazard. Local flora would be the best choice though.
3. The commercial activity and exaggerated Augmenting infrastructural facilities of over tourism are ought to be controlled. Encouraging the private sector participation to provide adequate accommodation and travel facilities and also to set up amusement and theme parks, all are wrong idea to destroy buffer zones and shrinking garden heritage.
4. Branding as archaeological tourism of monuments, temples, caves, statues, ancient relics, architecture, sculptures, potteries which have historical significance should be the focal interest. But



along with this, the forest camping could be offered if the greens all around could be improved and integrated with the heritage sites as a single complex. It should evolve programs for publicizing with the appropriate use of films, newspaper, magazines and websites. Tourism board can organize fairs and festivals by appointing marketing agents outside the region in order to promote its landscape significance.

5. Promotion and development of local forest based handicrafts, traditional cuisine and attires will be a very potential source of revenue.

Conclusion

Sophisticated public interest is essential for promoting not only Pancha Rathas, but also other archaeological sites of Mahabalipuram. A community that values and defends its archaeological infrastructure will subsidize a prosperous improvement of such scheme. But to achieve such goals, adequate funding; volunteering and political support will be main triggering factors. As a foremost sector of leisure industry, archaeological tourism is becoming popular and the number of people engaged in it continues to grow. Proper guidelines and good preservation practice will diminish the adverse impact and inspire wide-ranging tourism plans. Taking environment and the community around it into the consideration, new strategies and integrated tourism marketing should be promoted to regain its lost garden heritage. The whole site should be represented with authenticity and integrity along with its natural forest revival by ensuring financial support, facilities augmented products and services.

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