

MAKLI HILLS MONUMENT THATTA: HISTORY, ARCHITECTURE, CONSERVATION*

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ABSTRACT

Thatta, located 100 kilometers east of Karachi on Karachi-Hyderabad road, represented the glory of Sindh, from 14th to 17th centuries AD. From its present day turning and twisting narrow lanes and decaying houses, it is difficult to imagine that Thatta was once a great seat of learning and culture, a flourishing center of commerce and industry, and a cosmopolitan city sustaining hundreds of thousands of people. Yet, the monuments of Outstanding Universal Value situated here, bear eloquent evidence to its past grandeur.

Today these monuments are in need of preservation and conservation and face many threats. This paper presents an over view of the current condition of the Thatta Necropolis and discusses the various physical and environmental threats it faces. The paper argues that there is a need for the heritage department to outline a preservation strategy for the monuments and to clearly spell out the future development aims in the areas surrounding the necropolis. The paper also outlines certain aspects of development that need to be implemented immediately and others which should be incorporated in a phase wise master plan for the region.

The paper is largely based on the current works and association of the author with the Culture Tourism and Antiquities Department using a case study methodology.

Keywords: Monument, Thatta, Necropolis, Preservation, Conservation

1. HISTORY OF THE CITY OF THATTA

The origin of Thatta is cloaked in mystery. However, there are indications of prehistoric settlement in its vicinity, and the region figured significantly, during Alexander's campaign in 325 BC. As a matter of fact, uncertain efforts have been made to identify Thatta with Patala of Alexander's historians,

Pitasil of Hiun Tsang, and Devalsindi (Debal) of the Arabs. The first historical reference to Thatta is however, traceable near the end of 13th Century AD, in the verses of Amir Khusro, a great Persian poet of Delhi, wherein he has venerated the beauty of Thatta. Under the Samma rulers (1351-1520), it grew to surpass other cities of the region. Sultan Nizamuddin, popularly known as Jam Nindo, who was a great patron of learning, and himself a scholar, gifted Thatta with a number of *madrassas* (colleges) and libraries. He also invited great scholars from Iran such as Allama Jalaluddin Dawwani, Maulana Abdul Aziz Abhari, Maulana Asiruddin, Mir Muin and Mir Shams. After the fall of the Samma Dynasty in 1520, the Arghuns (1520-1555) occupied Thatta. Shah Hasan, the last of Arghun rulers, died in 1555. Shah Hasan, who is known to have transgressed all limits of civility in war, patronized men of letters in time of peace and was a poet himself. In 1557, during the rule of Isa Khan Tarkhan, who had succeeded Shah Hasan Arghun, Thatta experienced plunder by the Portuguese. They even had the daring to pluck the beautiful glazed tiles from the buildings of Thatta, and carry them as booty. The Tarkhans ruled over Sindh till 1590, when Thatta was annexed to the Mughal Empire by Akbar the Great (Figures 1 and 2).

Akbar made Thatta a part of *Soobah* (province) of Multan, and appointed a governor at Thatta. The governorship of Thatta continued nominally, in the family of Tarkhans until 1614, but the governors were not allowed to stay in Thatta, which was practically ruled by their deputies. Among the Tarkhan governors under the Mughals, Ghazi Beg, son of Jan Beg, was a man of letters. His Saqi Namah is an outstanding piece of literature. A number of Persian poets flourished at his court, most distinguished amongst them being Mirza Niamatullah Wasli, Mulla Asad Qissa Khawan, Hakim Faghfur Gilani, Talib and Shyda Isfahani. A number of histories of Sindh, including Tarikh-i-Sindh by Mir Muhammad Masum, Tarikh-i-Tabiri by Mir Muhammad Nisyani, Tarkhan Nama by Sayyad Muhammad, and Beglar

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• This paper was part of the History Group Conference organized by the Department of Architecture and Planning, NED University, Karachi



Figure-1: Map of Sindh showing the location of Thatta
Source:www.googleimages.com accessed 06/03/13.

Nama by Amir Sayyad Qasim Beglar were written during this period. The Mugals changed the governors frequently, and in a century and a quarter (1614-1739) as many as thirty eight governors ruled over Thatta. Isa Khan Tarkhan II, Nawab Amir Ahmad Khan, Nawab Zafar Khan, Nawab Hafizullah, and Nawab Aminuddin Khan were some of the munificent administrators of Thatta who contributed towards its growth. Some of the Mughal princes namely Prince Shahryar and Prince Sipahr Shikoh were also appointed governors of Thatta. The decline of Thatta began in 1739, when Mughal Emperor Muhammad Shah surrendered the province of Sindh to Nadir Shah of Iran. The latter, assigned its administration to Mian Nur Muhammad Kalhora, who shifted the capital from Thatta to Khudabad.

As stated earlier, from 14th to 17th centuries, Thatta was in fact one of the major seats of learning, fine arts and handicrafts. Moreover, it was a renowned and flourishing port of continental trade. Travelers, traders and scholars from different countries of Asia and Europe, thronged in Thatta and benefitted from its intellectual, cultural and commercial activities. European travelers, impressed by its

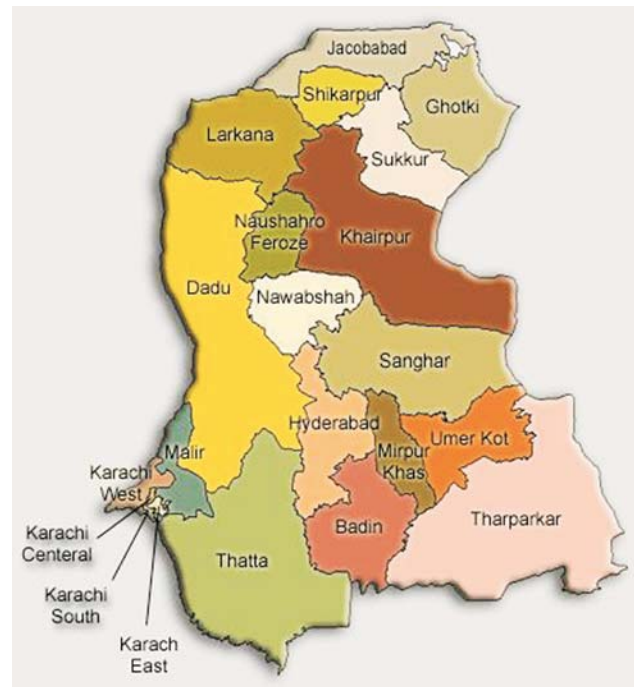


Figure-2: Current division of Sindh based on Districts
Source:www.googleimages.com accessed 06/03/13.

attraction and prosperity called it an “Eldorado”, ‘a utopia of wealth beyond avarice’. To the European trader and traveler, Thatta was practically synonymous with Sindh. The East India Company (Abbott, 1924: 67) which was initially a trading company, instructed its agent in 1607 AD to sail ‘to Laurie a good harbor within two miles of Negartuttie as great and as big as London’. Captain Paynton (Abbott, 1924: 68), who visited Thatta in 1613, described it as one of the most eminent markets of India. Mandelslo Thatta, as the most diligent in the Mughal kingdom. Captain Alexander Hamilton, who visited in 1699, states that Thatta was a large, densely populated, and a very rich city.

2. ARCHITECTURE OF THATTA

The unique ensemble of the monumental tombs and mausoleum at Makli Hill, a mile west of Thatta town, together with the four mosques at Thatta town represent the vestiges of its past glory (Figure 3). The great necropolis at Makli Hill, is one of the largest burial quarters in the world, littered with graves, tombs and mausoleums of saints, poets and writers, noblemen, governors, ministers, princes, kings

and queens. From southern to northern side of the Makli Hill ridge, there are three main groups of monuments, arranged in inverse historical sequence. The first group consists of the monuments of the Mughal period (1592-1739). The tombs of Jani Beg Tarkhan and Ghazi Beg Tarkhan, Baqi Beg Uzbek, Tughral Beg, Isa Khan Tarkhan II, Jan Baba, Diwan Shurfa Khan, and the graveyard of Nawab Amir Khan's family are the outstanding monuments to this group (Figures 4 and 5). The second group belongs to the Tarkhan and Arghun periods (1520-1592). It includes the graveyards of Isa Khan Tarkhan I, Baqi Beg Tarkhan, Ahinsa Bai, Sultan Ibrahim, Mir Sulaiman and many others

(Figure 6). The third group which occupies the extreme north represents the Samma Period (1351-1520) (Figure 7). It comprises of the tombs of Jam Nizam ud Din, Mubarak Khan, Malik Rajpal, a mosque and some canopies built over the unidentified graves. The hallmark of the architecture of Thatta is the variety of forms and techniques of decoration. Since architecture is determined, inter alia, by its environment, and represents the aspiration and genius of its people, the architecture of Thatta also bears the distinct marks of its variant ancestry, and shows independence from the imperial style of Delhi.



Figure-3: Location of Makli Necropolis in Thatta

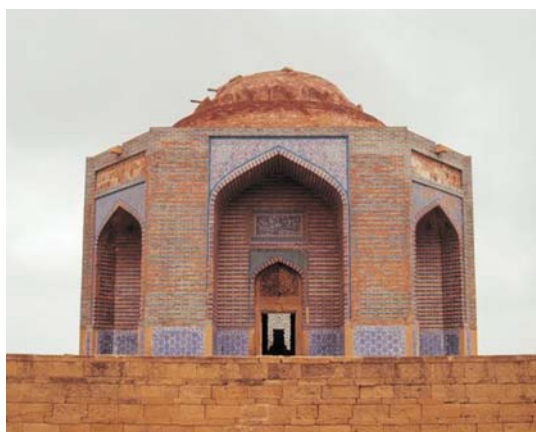


Figure-4: Tomb of Sani Beg Tarkhan on the Makli Necropolis

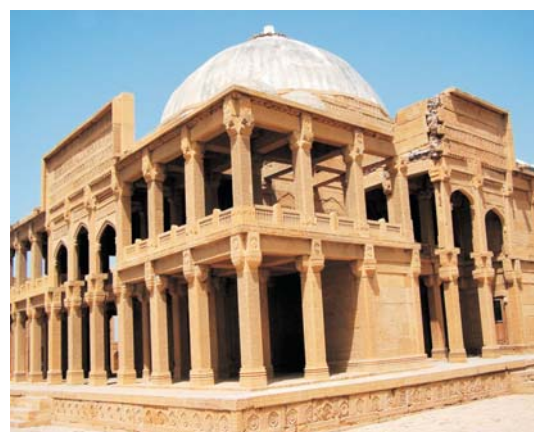


Figure-5: Tomb of Mirza Essa Khan Tarkhan on the Makli Necropolis



Figure-6: Tomb of Isa Khan Tarkhan on the Makli Necropolis

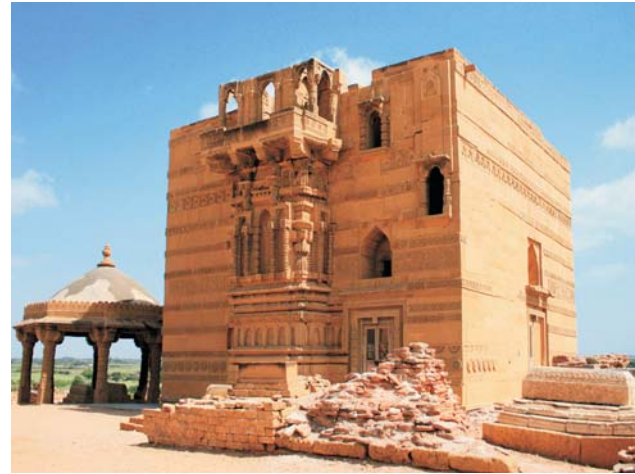


Figure-7: Tomb of Jam Nizam Uddin on the Makli Necropolis

The monuments here are built both in brick and in stone. The bricks used in the monuments are made of the best clay, and have clean edges, while the brick work in the buildings of Thatta is a superb example of craftsmanship. On the brick buildings, broad planes and simple surfaces prevail. In the absence of mouldings, these brick buildings would have been rather dull, but the superb glazed tiles and their colours more than compensate for the lack of this feature. As a matter of fact, the tiles go a long way to relieve the drab environment of the dry area. The glazed tiles, varying in shade from dark purple to light green and blue, are used in ornamental schemes of diverse geometrical and floral patterns. These tiles have been lavishly used in dados, panels and spandrels of the arches. In some buildings, plain and enamel faced bricks have been alternatively used, with pleasing effect. The white lines, visible in between the glazed and plain bricks, are only imitation joints of white enamel, while the real joints are generally invisible. The tiles of Thatta are different from those used in buildings at Multan, Lahore and Delhi. Their texture and patterns betray the dominant influence of Iran, modified to suit the local taste (Figure 8).



Figure-8: Tiles of Thatta

The stone buildings at Makli Hill, built in Jungshahi buff stone, are conspicuous for their carving and tracery work, which is generally in the style of stone workmanship in Gujarat, India. The stone carving at Thatta has been aptly described as 'lace work in stone'. The two techniques employed here, include fine filigree work carried out in relief, and the interlaced arabesque incised in the dressed surface of the stone. The tomb stones and graves are elaborately carved in geometrical patterns, and superb interlaced Arabic inscriptions, bounded by chain pattern borders. In a few cases, graves of ladies are also embellished

with jewellery, delicately carved in contemporary patterns. The early tombs datable from 14th and 15th centuries AD built in stone, are characterized by the octagonal pavilions standing on pillars, and surmounted by chhatris (canopies with corbelled domes). The pillars and lintels of these canopies are richly carved. The other popular type in this group of early tombs is the square chamber type. The tombs of Mubarak Khan, sister of Fateh Khan, Jam Sikandar Shah and Malik Rajpal, belonging to the Samma dynasty, fall in this group (Figure 9). The most imposing specimen of this type is, however, the tomb of the famous Samma ruler Sultan Nizamuddin, popularly known as Jam Nindo, who died in 1508. It is a square unfinished chamber, completed only up to the springing point of the dome. The corners of the square chamber are cut off by squinches, to carry the circular courses of the dome. Externally, the projecting back of the mihrab surmounted by a balcony constitutes the main feature.



Figure-9: Tomb of Malik Rajpal on the Makli Necropolis

The beauty of the tomb lies in its minute and profuse stone carving, bearing considerable Hindu influence, particularly noticeable in the pillars of the balcony, the miniature sikhara on the projecting back, and a band of geese on either side of the projecting back. The hands of carved stones in relief running round the walls, with designs including full and half blown lotuses, and arched panels with sun flowers, are the chief decorations. A band of excellent *tughra*, and interlaced Arabic inscriptions, provide fine example of calligraphy used as decorative motifs.

During the Mughal rule, although the local style continued to flourish unabated, yet it was influenced by the imperial Mughal style. In this period, most of the significant buildings at Makli Hill and Thatta were erected during Shah Jahan's reign. The tombs of Mirza Isa Khan Tarkhan II, Tughral Beg and Diwan Shurfa Khan at Makli, and the grand Shahjahani (Jami) Masjid at Thatta, are the outstanding edifices of this period.

The tomb of Isa Khan Tarkhan II, completed in 1644, is the most imposing stone building at Makli Hill. The tomb, which stands in a large enclosure surrounded by high stone walls, consists of a large domed chamber, surrounded by a pillared gallery in two storeys. The upper storey of the gallery is roofed by a series of small domes. Richly carved surface tracery is the dominant feature of the decoration, supplemented by honeycombed capitals, and fine arabesques. Many patterns may be identified as modified copies of tile-work.

The best preserved building on the Makli Hill, Diwan Shurfa Khan's tomb, is unparalleled for its massive structure and



Figure-10: Tomb of Diwan Shurfa Khan on the Makli Necropolis

solid appearance (Figure 10). It is a square structure with heavy round towers at the corners, and surmounted by a Persian dome originally covered with light blue glazed tiles. The simple, yet attractive colour scheme produced by red bricks, alternating with light blue, provides a pleasing effect. Diwan Shurfa Khan was a minister of Nawab Amir Khan, and the tomb was completed during his lifetime in 1638.

Due to its Outstanding Universal Value the Makli Hill Monuments, Thatta were inscribed in the World Heritage List in 1981.

3. GENERAL PROBLEMS EFFECTING THE MONUMENTS

The monuments at Makli, located on the brow of the hill, are exposed to many hazards, both natural as well as man-made.

The agencies of decay active on this site have generated problems ranging from general states of disrepair to conditions verging on collapse. Brick structures are in an advanced stage of decay and disintegration whilst many of the stone structures are in urgent need of repair and consolidation.

The situation concerning the uncovered graves is exacerbated by their easy accessibility whereby damage and loss by pilferage has assumed colossal proportions.

The ubiquitous symptoms of weathering, decay and deterioration in the masonry structures along with their causes and effects are summarized below:

- Cracking due to structural movements and settlements of large areas of some buildings.
- Cracking due to unequal settlement of elements poorly bonded to each other.
- Cracking due to poor detailing and construction such as thin stone facings to poor quality core filling.
- Spelling, splitting and lifting due to the volume increases resulting from embedded ferrous material.
- Staining, decay and open joints due to neglect of joint condition. The same neglected joints have become conduits for the free access of water and dust particles.
- Roughened surfaces on stone where washed and 'etched' by rain especially as a result of accelerated weathering out of weaker areas of pockets of soft sand or clay beds.
- Cracking, splitting and spelling of stone surfaces where normally sheltered from direct rain. This may be due to the formation of crystalline sulphate skins, which are prone to failure ultimately.
- 'Contour scaling' or uniform thickness scales separating from stones following the profile of the surface. This effect is normally associated with wetting and drying cycles, followed by migration of natural cementing matrices, exacerbated by the blocking of surface pores with materials deposited from the atmosphere.
- Scaling and powdering of stone surfaces linked with efflorescence and due to soluble salt crystallization damage.

3.1. Presence of Harmful Salts in the Structures

The incidence of sulphate attack and salt action appears to be widespread on the site. The level at which the resultant damage is visible, i.e. near the tops of the walls or within the domes, combined with the fact that the water table on the Hill is very low suggest that:

- Deposition of salts in the fabric is occurring through the salt-laden moist air to which the monuments have continuous exposure all the year round.
- Presence of calcium sulphate is a very distinct possibility for which the laboratory testing of bricks and mortars needs to be commissioned. It is possible that impurities

were present in the original building materials and may have been re-introduced unwittingly in materials used for repair and restoration work in more recent times.

The severe disintegration of many brick structures would therefore suggest the strong possibility of the presence of contaminated original material alongwith continued exposure to a salt laden moist atmosphere.

3.2. The Action of Wind

Thatta falls within a zone of high wind velocity. The velocity at times can reach 30 miles per hour, which, normally, is limited to a few hours annually. The average is about 10-12 miles per hour.

Exposure to winds at these velocities, besides their saline nature, has other implications for the monuments at Makli. It is worth considering these to form the overall view of cause and effect in the general condition of the monuments.

Cracks and fissures abound in the structures on site. Penetration of these by rain, driven by wind pressure, is bringing about the most harmful effects of the combination, causing serious internal decay after saturation of the external surfaces.

3.2. Problems of Rain Water Disposal and Organic Growth

A qualitative appraisal of the pattern, direction and intensity of precipitation is of crucial importance in the maintenance and preservation of historic buildings.

On the whole, Sindh suffers from paucity of rainfall. In addition to being precarious and scanty, its incidence is highly variable. The little precipitation it gets is almost invariably due to cyclonic storms. In lower Sindh the average rainfall is about 7 inches with only about eight rainy days in the whole year. July is the wettest month.

There is a peculiarity about the rainfall pattern. There are gaps of anything up to six or seven years of scarcity followed by peaks of good and, at times, heavy rainfall.

Geologically, ground movements occur all the time. The rainfall quirks described above would abnormally accentuate such movements during and after the peculiar spells of heavy rainfall. Of these movements those that induce differential settlements are of particular interest. Investigations of suspected foundation trouble would therefore be necessary

where indications of differential settlement such as cracking and consequential damage have manifested.

Rain damage to the masonry above ground will occur in several ways. Penetration of rain to the interior of building will cause several types of decay.

After saturation of the brick or stone surfaces, water will stream down vertical surfaces and wind pressure will force these through cracks or even through the material itself because of its high porosity.

Rain penetration can cause internal decay in stonewalls, forming voids which could be as large as one-fortieth of the wall's volume in a period of about four to five centuries.

3.4. Thermal Expansion

Thermal movement is a well known cause of decay in buildings. Exposure of the monuments to a high diurnal range of temperature could not indefinitely postpone the effects of repeated heating and cooling of the outer skins of masonry.

Despite the differential has been the core and the enclosing skins, the walls by natural their assembly are capable of absorbing many stresses to remarkable degree. The absorption of stresses occurs in the following pattern:

- a. Compression of mortar
- b. Absorption of internal stresses
- c. Friction between blocks of stones

And the whole is aided by the plasticity of the lime mortar, the serious decay or disintegration of which will adversely affect the entire process.

3.5. The Effects of Condensation and Aerosols

The effects of rain penetration and exposure to a moisture laden atmosphere, with particular reference to salt crystallization, Water can also gain access to masonry materials through the agencies of condensation and aerosols-both of which are likely to be active on this site.

3.6. The Effects of Earthquakes

Earthquake shocks consist of direct primary waves, secondary waves, and surface ripples of Raleigh waves. The resultant

violent earth-shaking shocks induce dynamic movements in all three dimensions of a building.

Serious damage can occur from major tremors. Minor tremors, consisting of smaller relative movements and energy releases, nevertheless, adversely affect the stability of the structures by accelerating the processes of decay due to instability brought about by other forces.

The extent of earthquake damage depends upon the interplay of many complex factors and usually becomes apparent by symptoms such as:

- i. Cracking at the corners in walls
- ii. Cracking where stresses concentrate around door openings and in arches
- iii. Downward slippage of the center portion of an arch, wedging and prising apart the structure
- iv. Falling in of portions of domes
- v. Vibration and the consequent cracking of columns
- vi. Damage to badly bonded elements. This usually takes place during severe earthquakes when the elements in question batter each other due to variable rates of oscillation
- vii. Disintegration of well-built structure into large lumps
- viii. Disintegration of poorly-built structures into rubble

3.7. Wear and Tear Caused by Visitors

Despite lack of facilities, in hospitability of weather and an almost desolate environment, the number of visitors to the monuments is quite impressive. The numbers are bound to increase as consciousness of the country's heritage grows and as the Makli Monuments become more firmly established on the international tourist map.

The impact on the fabric of the monuments, quite distinct from vandalism, resulting from wear and tear is already meriting serious attention.

4. ENVIRONMENTAL PROBLEMS

4.1. Lack of Vegetation

To walk the entire length of the site and back is quite demanding considering the distances involved. The route, unrelieved by any shade or tree becomes even more taxing in the unremitting heat and glare of the sun.

4.2. Road access

A narrow metalled road takes off from the Karachi-Thatta road, past the first group of monuments to the second group. From the second to the third groups there is a stony carriageway, hardly tolerable in vehicle, let alone on foot or bicycle.

4.3. Electricity supply

A supply exists to the Department's rest house and offices and to the Tomb of Abdullah Shah Ashabi.

4.4. Water supply

This is a major problem on the site. There is, at best, a primitive and by no means certain, water supply to the rest house and offices. Any additional demands from the current source cannot be met.

4.5. Sewage

The present arrangement caters for the needs of the rest house and department's offices.

5. ARCHAEOLOGICAL PROBLEMS

5.1. Pilferage and Vandalism

The problems of pilferage are all apparent. An almost unguarded and a very extensive site with a large number of ruins on it presents itself as an easy target for an unending source of good quality building material. The pilfering has been rife on this site since long before partition. Apparently, in pre-partition times an appropriate fee could produce many willing hands that would remove cartloads of material from the site.

An aspect of vandalism is the growing incidence of graffiti. The use of a variety of writing implements it as current. Regrettably incisions into the surface of masonry with sharp implement is also visible.

There are problems associated with food consumption. Many a picnic unfold itself within the confines of the monument where shade and coolness are readily available. Spillage of liquid and general litter from food consumption is not an uncommon sight. Beetlenut spits are indiscriminately lodged on masonry surfaces.

There are instances of incense and oil lamp burning on some of the graves. This is not only disfiguring but is also adding to the decay of the surfaces concerned.

Urination against or near the masonry structures is also in evidence from time to time.

5.2. Local Collectors

The problem of pilferage can be added to the advent of the present day souvenir-seekers and the treasure-hunters. Although both are forms of pilfering, the aims of the perpetrators are distinctly different.

The souvenir-seekers are many and come from all sections of society from the high and mighty down to the very humble and low. The range covers anything that will serve as a mantle-shelf decoration to glazed tiles and carved stones from sarcophagi as prestige elements, which are built into a prominent position in a new dwelling. A carved stone capital, for instance, was pressed into service as a receptacle, after appropriate modification, for an indoor plant.

The problem of the treasure-hunter is likely to grow owing to the greater interest developing in the public consciousness in both history and culture. The lucrative pursuit could become an additional threat to the monuments because of the resale value of many items from the site on the commercial market, both nationally as well as internationally.

6. PRESENTATION OF THE MONUMENTS

Monument Zones

Other than the fact that the monuments are grouped into three natural zones there is no indication or explanation available to the visitor regarding the arrangement. Taking the advantage of the natural grouping it would be convenient, therefore, to define the 'Monument Area' of groups and to plan the access, servicing and provision of facilities to each accordingly.

The numerous graves in the open, located throughout the site, could be defined as sub zones of the three Monument Areas.

Local Amenities

Local Amenities near the site are limited to a few small shops. There is also a boarding and lighting-point used by buses playing the National Highway between Karachi and Hyderabad via Thatta. The road to Jangshahi takes off westwards at this point whilst Thatta the nearest town for shopping and other amenities is two miles away due east.

Tourism: Lack of Promotional Materials

Makli Hills with its vast necropolis is potentially a very desirable tourist attraction. Other than one leaflet produced by the Pakistan Tourist Development Corporation Limited and the booklet of Thatta published by the Department of Archaeology and Museums, there is no other promotional material available.

Visitor Facilities

Other than the Department of Archaeology and Museum's Rest House there are no facilities available for visitors. Since the Rest House itself is reserved for use by the Department's Officials or by other Government officials, its existence may be discounted for all practical purposes. It is therefore an accurate reflection of the truth to say that visitor facilities at the Makli Hills Monuments site are non-existent.

7. POSSIBLE FUTURE DEVELOPMENT AIMS

7.1. For the Monuments Generally

7.1.1. Preventing the Cause or Effect of Salt Action

The presence of salt in the monuments and its damaging effects are due to crystallization. The action of rainwater and moisture from the atmosphere would aid the crystallization of salts from the contaminated.

In selected areas of some monuments a fairly quick method of tackling the degradation of brickwork by sulphate attack can be undertaken almost immediately. This will involve the thorough brushing down, with a dry hard brush, of all salt affected areas, taking care to brush the salts into a container and not onto the ground beneath. Water must not be used under any circumstances as the salts will be dissolved and reabsorbed into wall. Areas for such treatment must be indicated on the lavational grids produced from the survey.

Record photographs should be taken every six months of the affected areas, for comparative readings. If reduction in

salt action is indicated within the first year then nothing additional to this process will be required other than the application of clay poultices over the worst areas. Any future work must ensure that all materials used in the mixes are free of impurities and the water must be fresh water; originally used materials should be batch tested, brick dust should be derived from well-burnt bricks straight from the kiln and not second hand bricks; the lime should be pure and slaked from real limestone and not a substitute. Finally, all lime should be rigorously tested for its sulphate content.

7.1.2. Reinsertion of Stone

Treatment of symptoms, rather than causes, has not only incurred unnecessary expense but has compounded the original problem by the introduction of new dimensions to it. Replacement, whether of ashlars or of elaborately worked historic stones for instance, cannot and must not be undertaken lightly.

Similarly, there have been instances of redressing stone. Removal of the original face from an old stone as a practice is quite alien to the normal principles of conservation. As a practice it must only be undertaken as a last resort where stones have become so badly decayed or damaged that some intervention is justified. Even then there are other options that must be considered first.

For repair and replacement work, a thorough survey should assess:

- The whole condition of the wall
- Condition of individual stones
- Condition of joints

The following options must then be considered:

- Carry out minimal de-scaling and mortar filling
- Stitch and fill fractured stones
- Carry out minimal piecing of stones
- Carry out minimal placing in mortar (plastic repair)
- Treat joints
- Replace stones

In arriving at a decision to replace stone, alternatives suggested above must, in the first instance, have been properly studied and evaluated. The criteria for identifying stones to be replaced should include the value of the stone in its setting, context, function and the timing of the proposed work.

7.1.3. Repair of Brickwork

Defects observed in brick walls are:

- Aging and decay of pointing
- Failure of individual bricks
- Vertical cracking in arches and in the walls above
- Diagonal cracks.

Repair work undertaken without first rectifying the cause of the defect will only be cosmetic.

Repairs will generally involve cutting in new matching brickwork. Not only should new bricks match the color and texture of the old, the bonding and jointing of the new work should also match that of the old.

The effectiveness of a brick wall against rain penetration and its durability depend upon the condition of its pointing. In pointing and re-pointing work, colour of mortar along with the profile and texture of the pointing are important. Raking out of brickwork joints should be to a minimum depth of 3/4". Pointing should be inserted neatly with a suitable trowel ensuring there are no smudgy edges.

Samples should be erected before final specification so that the interrelated factors of colours, texture and profile can all be decided upon.

In the renewal of the face of a wall the new brickwork must be tied back to the old. This is best done as in cavity wall construction. The gap between the old and the new should be grouted in to prevent any water seepage.

7.1.4. Stabilization, Structural Repairs and Core work

The guiding principle, again, is to avoid an "overkill" response. The objective is to carry out repair and consolidation with the minimum disturbance leaving little or no evidence of intervention.

Problems requiring attention, especially in the ruined buildings are:

- Fracturing due to unequal settlement
- Fracturing due to geological movements
- Local building due to loss of integrity of rubble cored walls and due to lack of ties between the masonry skins enclosing the core material
- Leaning due to settlement
- Leaning due to loss of restraint
- Fractures due to loss of bearings

Taking down and rebuilding and even the introduction of new masonry is never desirable in historic buildings and should only be seen as a last resort solution.

Structural repairs incorporating wall head beams, fracture stitching, underpinning and secret lintels should be resorted to after careful diagnosis of the problems.

The stability of many ruined monuments has been considerably jeopardized by the loss of significant structural elements. These are in need of immediate first aid to ensure that further collapse, disintegration or vandalism is kept to a minimum.

Formwork to support partially collapsed domes and arches in danger of collapse along with shoring against leaning and bulging walls are the necessary emergency measures to be adopted now. Secure fencing around the endangered structures should also be provided.

Exposed cores of the ruined masonry structures are vulnerable to the effects of weathering. They are also an easy target for thieves. Neglected masonry buildings always provided a tempting source of ready cut and dressed stone and facing bricks, which can be prised away from the face leaving the rough core filling exposed.

Exposed areas of cores will require general treatments involving techniques known as 'rough racking'. The work demands a high level of skill and experience. The aim is to reproduce the appearance of existing exposed core whilst, concurrently, providing adequate protection for the wall. As always with conservation work, the same care has to be exercised in executing 'rough racking' as in pointing face

work. Under no circumstances must conservation core work be finished to look like rubble facing.

Where it is known that original openings formed part of the core work, allowances will have to be made for the missing face work at those openings by keeping the core sufficiently back to account for the space which the face work originally occupied.

Detail investigation is also required to be done for checking the poor weathering material.

7.1.5. The Control of Rainwater

There are essentially two problems that need immediate attention.

The first relates to the percolation of water through the structures. This is made possible by cracks in the foot finishes and by the masonry open joints in the buildings remedial measures dealing with these must be into the types and concentrations of salts present and any desalination procedures necessary.

The second relates to the run-off of rainwater from the structure. The discharge from gargoyles is fairly close to the base of the structure and because it has nowhere to go in particular it will seep back into the structure from the adjoining ground. Stone plinths should be checked for their falls and any adjustments necessary should be made to ensure a proper run-off. For the buildings without plinths, a suitable width of paving laid to fall with a run-off channel at the outer edges will be necessary to gather and direct the flow of storm water.

7.1.6. Dealing with Earthquake Damage

Each monument is a case for individual study in which detailed inspections of the fabric should be undertaken. Strengthening against dynamic loads should be considered in the most practicable and economic way in keeping with its overall conservation plan.

Investigation of foundations must form part of the detailed inspections since earthquake shocks are transmitted to the building through them.

Particular attention must be given to strutting and shoring so as to prevent collapse and to make safe dangerous elements.

Principles of repair should aim at restoring and improving

the building's capacity to resist an earthquake. Minimizing disintegration of elements into mutually destructive parts must be achieved by their proper typing in.

In improving the absorption capacity of the building the fabric must be considered as a whole.

7.1.7. Prevention of Wear and Tear by Visitors

A greater degree of control and supervision needs to be provided for the site. A variety of means to direct and regulate the movement of visitors will need to be explored. Some suggestions are given further on. At the monuments themselves, however, greater supervision of visitor activity must be aimed for. Consumption of food and drink and the clambering over of walls and other features of structures must be forbidden and enforced. Additional watchmen and sign posting will be required.

7.2. Proposals to Protect Environment

7.2.1. Monument Zone

Defining the cartilage of the monument should protect the immediate surroundings of each monument. Inevitably, some of the canopies, roofless plinths and nearby graves in the open will become grouped with principal monuments. Definitions of the zones might then be achieved by hedges, bollards, fencing, etc. in a variety of combinations. Paving should be used to define pathways by which the visitors will be enabled to circumambulate within and around the zones.

7.2.2. Monument Areas

Visitor facilities will also form part of the areas and, therefore, will need to be integrated in the overall scheme of circulation.

8. ARCHAEOLOGICAL PROPOSALS

8.1. Protection against pilferage and vandalism

Vigilance by the monument watchmen cannot be overstated. The effectiveness of the watch will obviously depend upon the numbers and frequency of visitors. Notices discouraging vandalistic practices and fines for commission of acts or vandalism must be displayed as warnings alongside the descriptive notices for each monument.

With the expansion in the number of list and theft should be considerably reduced. For the more report sizes

observation and control points should be set up for supervisory staff from where effective vigilance could be maintained. The regular patrolling of the entire site cannot be overemphasized.

It is proposed that a much more prohibitive barrier be erected around the entire site. Serious consideration should be given to solid walling of stone or stone and brick. Manned gateways through the wall will then become effective checkpoints for the prevention and control of pilferage from site.

8.2. Local Private Collection

All private collections should eventually be acquired by the department, with a view to housing them in a specifically dedicated museum on the site. The collections should be properly recorded.

9. PRESERVATION OF THE MONUMENTS

9.1. Accessibility

The main access to the monuments at Makli is by road on the National Highway linking Karachi with Hyderabad. This will continue to be the principle means of access in the foreseeable future.

Visitors will arrive by:

Bus: Individuals and small groups

Hired Coach: Organized groups and parties

Private Car: Family outings

Hired Car: Foreign tourists

Parking facilities will be required for coaches and cars. It is proposed that this will be along the perimeter of the site starting from the entrance gateway running westwards parallel to the Jungshahi Road. No vehicle, other than those belonging to the Department, should be allowed beyond that point in order to keep exhaust emissions in the vicinity of the monuments to a minimum.

It is further proposed that visitors be marshaled into groups at the main entrance from where they would proceed on their visit, in what would amount to a mini conducted tour, in the Department's mini buses for which a nominal fare would be payable.

Bicycles for hire should also be available to those requiring more freedom but not the strenuous exertion of a very long walk to the northern end of the site and back.

Clear and explanatory signposting should be designed and erected at strategic locations so as to direct visitors on pre-defined routes.

Whereas the road linking the three areas must be paved in its entirety, it is also proposed that an ample pavement for pedestrians be provided on at least one side of the road.

9.1.1. Visitor Accommodation

Overnight accommodation at Makli itself is not being proposed because demand for it is not likely to be pressing in the near and foreseeable future. On the whole the nature of visits will be on the basis of day trips for most people. Of the visitors whose purpose is much more serious than that of the casual sightseer, some might require overnight accommodation. For these, the excellently located motel at Kinjher Lake is by far the most suitable provision. Indeed, should demand grow for provision of overnight accommodation for visitors to Makli, first considerations should be focused on enlarging the motel complex at Kinjher.

9.1.2. Visitor Facilities in General

The distances between the areas are quite considerable especially for those on foot and particularly those accompanied by children. It is therefore proposed that separate visitor amenities be provided within each area.

9.1.3. Infrastructure for Visitors

Signposts have been mentioned previously. These must be installed throughout the site and should be design to be read by pedestrians and slow moving traffic. Each monument should display a securely and discreetly fixed plate giving, very briefly, its name and history. Also located near the amenity and facilities areas should be clearly painted maps of the site, with "You are Here" marked to assist visitors to orientate themselves. All signage must be written in English, Sindhi and Urdu.

10. CONCLUSION

Based on the documentation and analysis of the Makli Necropolis over the years, this paper identifies a preservation strategy for the monuments and spells out possible future development aims. The paper also outlines certain works

that should be put to effect immediately, in order to prevent further deterioration of the monuments. These will be in the nature of temporary stabilization by shoring, erection of formwork to arches and domes and the fencing off, generally, of dangerous structures.

Also to be undertaken at this point in time are certain analytical investigations as the essential and necessary preliminary steps, which will facilitate the principal and eventual task of the conservation of the monuments. Identification of the boundaries of the inscribed properties and their buffer zones must be done immediately and regulatory measures should be developed to ensure the protection and management of the monuments. Some of the

other areas that need to be addressed, as identified and discussed in this paper, are environmental monitoring and diagnosis of problems and determination to solve consequential damage, effect of condensation and aerosols, earthquakes, wear and tear by visitors and archaeological problems contributing to its deterioration. Furthermore, a comprehensive strategy for emergency, stabilization, conservation and maintenance works with short, mid and long term objectives should be outlined. Proposal to stop trespassing, encroachment and animal entrance to the site of the Necropolis should be put in effect and a Management Plan for the property, including Conservation Actions, Public use and Disaster Risk Management Plan, should be immediately outlined.

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