



Cover Page



SENSORY INFLUENCE OF WATER IN ARCHITECTURE

¹Akshita Dwivedi and ²Prof. Afaq Ahmed

¹B.Arch. 4th Year and ²Supervisor

^{1&2} Department of Architecture and Planning

Dr. A.P.J. Abdul Kalam Technical University

Lucknow, Uttar Pradesh, India

ABSTRACT

Water is one the most fundamental source of human life since the origin of life on earth. Water is regarded as the most extraordinary design element since the prehistoric times as it is cheap, easily available, is in abundant amount and is versatile in nature. The simple natural element holds the power to transform any monotonous space into something magnificent as it offers both soothing effect as well as physical stimulation. The topic taken in the research is more inclined towards the many ways in which water is used as design element in architecture, and further how their relationship enhances the human mind.

People construct structures to save themselves from harsh environment and to do this they built walls around them and due to such conditions, they got detached from the nature and water is such an element which plays a sensual role in reconnecting with nature although having an unchanged identity it can be coaxed and transformed. Water is an invisible architecture which plays a crucial role in connecting people with nature by hearing, seeing, and touching it water in innumerable ways. it can bring back the sustainability and facilitate in the development of better society.

Keywords: Water, architecture, outdoor, indoor, in-between spaces



Cover Page



DOI: <http://ijmer.in.doi./2022/11.11.20>
www.ijmer.in

Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

INTRODUCTION

1.1 BACKGROUND

Water is one the most fundamental source of human life since the origin of life on earth. Water is regarded as the most extraordinary design element since the prehistoric times as it is cheap, easily available, is in abundant amount and is versatile in nature. The simple natural element holds the power to transform any monotonous space into something magnificent as it provides the user group both soothing effect as well as physical stimulation. The topic taken in the research is more inclined towards the many ways in which water is used as design element in architecture, and further how their relationship enhances the senses of human with its tangible form like touch, sound, taste.

Every living creature needs shelter to save themselves from harsh environment and to do this they built walls around them and due to such conditions, they got detached from the nature and water is such an element which plays a sensual role in reconnecting with nature although having an unchanged identity it can be coaxed and transformed. it can bring back the sustainability and facilitate in the development of better society.

Architecture and water, combining these contradictory entities which bring out an extraordinary design potential form. They are considered opposites as architecture as understood is firm and fixed whereas water is seen as flowing and dynamic. This study is the accumulation of the various water centric architectural design form from the early ages to the present period, substituted with numerous examples and case studies. The transitional period between Mughal architecture to modern architecture will be discussed i.e., gradual shift from functionality to aesthetics.



Figure 1 Mughal Water channel

1.2 HISTORY

TYOLOGY OF WATER BODIES OCCURED FROM EARLY AGES TO MODERN ERA

Water as an architectural element has been used and specified in chromatic situations right from a residential block to urban level and the studies and case study proves that the water as a natural element in form of pond, fountain, water channel, serves as a natural agent for microclimate modifier which has reduce the reliance of any other cooling agent if utilized in particularly favorable climate such as hot and dry or composite especially where it can deliver effective cooling creating comfort for the occupants residing in the building. They say that living form emerged from water maybe that's why humans are always drawn towards it more without even realizing it. For instance, any form of water makes a place pleasant even in different state of matter that is liquid, solid or gas.



Figure 2 Typology of water in different time zone



Cover Page



DOI: <http://ijmer.in.doi./2022/11.11.20>
www.ijmer.in

Digital Certificate of Publication: www.ijmer.in/pdf/e-CertificateofPublication-IJMER.pdf

TYOLOGY OF WATER AS AN ARCHITECTURAL ELEMENT IN DIFFERENT TIME ZONE

No	Architectural era	Architectural styles	Architectural inventions
I.	Prehistoric times	Megalithic architecture	Reservoirs
		Cave architecture	River control
		Ancient/tribal societies	
II.	Ancient civilizations and antiquity	Middle East, Far East	Water-conduit, sewerage sewer, bridges, water mills, gardens, palaces baths, toilets
		New World, Ancient Greek, Roman Empire	
III.	Medieval architecture	Byzantine, (Pre-) Romanesque, Gothic	Military: defenses, castles, water mills and bridges (developed) canals of cities, houses on bridge
IV.	Renaissance and Baroque	Renaissance, Mannerism Baroque, Rococo, Neoclassical, Revivalism	Underground cisterns, Paris Opera House, urban waste-water system, springhouses, public utility, water castles, gardens
V.	19th century	Éclecticisme, Orientalism Beaux-Arts, Art Nouveau, Industrial architecture	Urban river control – urbanism, steel bridges, industrial water, waterworks, engineering facilities, steam engines, beam engine houses, urban docks, palm houses
VI.	Modern architecture	Expressionist, Art Deco, International Style, Bauhaus, Postmodern, Deconstructivism	3F – form follows function, water differentiation, new technological solutions, flowing spaces
VII.	Contemporary architecture	The 21st century International, contemporary trends	New approach: water as a medium, new technologies, environmental awareness, fluid architecture, floating buildings
VIII.	Futurology	Utopias, Research, and development	Water reinterpretation, swimming cities, underwater cities



Cover Page



1.3 AIM

Focus on how the presence of water either as a function or feature enriches or enhances the design of spaces and how the sensory human experience is perceiving this relationship.

1.4 OBJECTIVES

1. To find out how water appeared in different periods of architectural history
2. To focus on how one is influenced by the presence of water and is it a measure for wellbeing.
3. To Study about how water enhances as element in architecture.
4. To study the ways in which water can be implied in architectural design.

1.5 SCOPE AND LIMITATIONS

The research focuses the architecture of water i.e., what physical laws governs its behavior and how liquids acts and how our senses react towards it and most importantly how its symbolism relates to us human being as water in any built environment is composed of stories above and beyond its molecular fusion or the shape.

The research will be limited to use of water as design element and how it is responsive and sensitive to its user building typology will be limited to Mughal / Islamic architecture.

1.6 METHODOLOGY

The study will be conducted in the following steps:

- Understand the subject domain with basic research data (research papers, books, blogs, journal reports, etc.) available on the web.
- Using secondary research data and projects to gather information about different elements that can help design emotional spaces.
- Basic and secondary case studies that will help to assess the elements of the Sensory experiential architecture.

The research paper will emphasize understanding design and how to improve sensory information. How architectural areas can be improved by using design elements to have a better sensory feel.

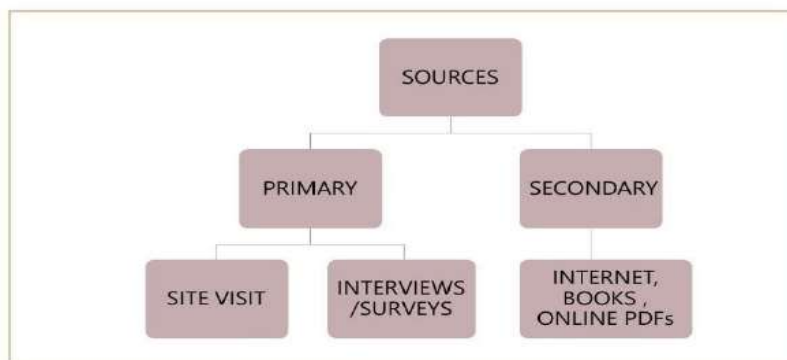


Figure 3 Table for Data Analysis



Cover Page



LITERATURE STUDY

2.1 WHAT IS SENSORY DESIGN?

Space is defined as a continuous sensory experience. The bodily experience of a person in that space influences its experience or perception of that space. Humans rely on their sensory modes like sound, visual, touch or taste to better understand identify and engage with their surroundings.

Tactile qualities are most powerful element to provoke people in appreciating our nature and manmade structures in where architecture should speak on the behalf of memories and experiences of the designers. The intersection of art, architecture and architect should convey a narrative behind the design. The research paper is aimed to explore Mughal architecture's modest poetry qualities in creating an intrigued architectural marvel by emphasizing the sensory qualities and how the sensory stimuli influence the occupants and became the most reliable element for people and visitors.

2.1.1 Definition of terms

Terms which will be used throughout this research paper are defined as follows:

Body/Bodily experience: The experience of a space experienced initially through the body itself using its senses.

Senses: humans and animals perceive stimuli originating from outside or inside the body using faculties, such as sight, hearing, smell, taste, or touch by which they can tell the perception of that space or any object.

Sensory stimulation: Stimulation of the brain through any of the sensory modes.

Tactile: tangible qualities of any matter i.e., touch

Visual: visual impact of any object perceived through lightning striking the surface.

Emotional Sensibility: A form of perception that works incredibly quickly.

2.1.2 Material compatibility

Materials shows splendid reaction between them. They react with one another by expressing their radiance hence, material composition is risen to its uniqueness level. Islamic people were middle east men where they used stone, granite, rocks, and marbles as a building material as these natural stones, marbles and granite countertops have varying degrees of porosity, which means they will absorb water as their structural composition id more like capillaries in human body which allows



Cover Page



the penetration of liquids and gases and easily flows or absorbs through this natural structural integrity

2.1.3 Sound of space

Spaces emits certain sound, conversing with the inhabitants to inject sensuality within it. This suggests that interior of any space is defined as the large musical instruments which collects sound amplifies it transmit it too elsewhere. This philosophy is highly emphasized in Fatehpur Sikri, Agra (residence of Mughal king Akbar). Architecture of senses is formulated in the courtyard with large waterbody in middle of the area upon which the seating is built for the musicians and artist for social gathering the water not only enhances the space but also add touch of spirituality in the space which the people or the visitors can experience in the changing atmosphere. This is associated to a concept of Phenomenology- the appreciation of architecture through senses.

2.1.4 Temperature of a Space

Reflecting to architecture of senses, temperature is one of most important elements in creating atmospheres. Every building has its own relative temperature. Taking Fatehpur Sikri as an example, the temperature of the spaces is explained well through the material used which are local material sandstone and marble and extensive use of different kind of water bodies like pool, channel, fountain. When it was hot outside, the water channel which was directly connected to the nearby lake, river and was accessed through the inbuilt water body which kept the temperature of the palace cool as forest and when it was cold the channel was temporarily closed, or they royal family moved to winter palace.

2.1.5 Surrounding objects

Islamic people were not only great engineers were also very spiritual people most of their design were inspired by the objects, people activities, things, and nature. They emphasize on the right place of them in designing an architectural space hence site context is paramount of importance in their design.

One of the approaches- Mughals gives an insight of building future as if it happens without them. They envisage the future of the structures which is designed by them and how they will be used ahead.

‘A sense of wonder’ is a keyword used in most of its architectural designs highlighting on the pleasure of the surrounding objects to the occupants. Besides they tackle on the memorial traces of the surrounding objects which has a great potential to evoke emotional sensibility and appreciation of the building’s occupants. In architectural terms the design spaces will communicate indirectly with the occupants hence and interaction can be created within volume of space.

2.1.6 Voyage of discovery



Cover Page



The spatial architecture is formulated to create a sense of experience and belongings to the occupant. In people’s perspective, architecture is a spatial art in which it generally associates to movement yet, it is also a temporary art. When we talk about the movement in any built space, it is crucial that we inject the feeling of freedom in movement, a mood that have less to so with directing people and more with the will of a individual such that walking is creates the pleasure for human. Taking Taj Mahal as an example, Mughals tried to find a way a of bringing separate parts of the building together which creates a wholesome structure itself with that Charbagh system garden water channel is used as line of axis mirroring both sides of the mausoleum. There are spaces that visitors enter and begin to feel like a wonder place or sense of paradise Hence, they will not just pass through the building it will create a sensory movement in built form itself. There is always extraordinary hoe lights mashups with the water something which draw the attention of people around the corner- the way light falls, a great source of pleasure. The feeling that they are not directed by any medium but by their own will. The spatial energy that can make them drift along and it is kind of voyage of discovery using these key elements: direction, seduction, letting go and granting freedom.

2.1.7 Relation between interior and exterior

Architecture speaks with the occupants via its interior and exterior environments. This channel, crossings, Jaalis, arched door acts as translational space between the inside and outside world, holding us. Externally, the architecture is presented by its façade in which it has a certain language to communicate with the people. Sometimes the façade injects some surprise elements, to not fully express what is been design inside. The same language is used throughout the building, and it has a great deal with atmosphere to create a better spatial experience for the users.

2.1.8. Levels of intimacy

Architecture is defined by dimensions, proportion, and scale. Levels within spaces which it associates to proximity and distances. The size of buildings; bigger and smaller has to do with the expression and perception given by people. Since this research paper focuses on natural element water the scale of water body conveys different moods which contribute to the one’s experience within spaces regardless his/her physical, emotional, and spiritual condition.

2.1.8 Water and Light

Water and light in Islamic philosophy, is the base of the universe, philosophies which are itself derived from their holy book Quran and the brightness from natural bodies like sun and moon are the factor of cleansing, purity, and brilliance. They tried to include these concepts of living near their god through their architecture in such a way that context of Islamic architecture itself shows why their buildings are purely white and have different pleasant water bodies surrounding it which is symbol for beauty, purity, brilliance, and peace. Presence of light and water gives meaning to life maybe because they are the oldest and element in nature and will last till end of time.

2.1.9 Water in Mughal Gardens



Cover Page



Water in Islam serves a deeper function than just providing a thermal comfort for the inhabitants. It makes a judgement and considerations on their feelings, desires, and pleasurable capacities buildings or spaces have become the visual which shows lack of existential depth. Use of water in Islamic gardens is very subtle and artistic, because in these Charbagh style gardens, water is not only used for irrigation purposes but also conceptual, poetic, and artistically as it a factor of cleansing and purity use of it has decorated garden space and with its mere presence creates freshness, movement, and beauty in the garden.

The appearance and presence of water in the garden is based on specific concepts, and its distribution is governed by discipline and rules that, on the one hand, pay attention to the physical and technical characteristics of irrigation, while also considering the concepts of aesthetics, landscaping, and architecture. Garden architecture in Islamic gardens is water architecture, and the combination of water and building endangers a unique epic of poetry, magnificence, and music in the privacy of trees. Mughals were desert people, so they were obsessed with water, which they believed was Jannat's gift. The description of Paradise in the Holy Quran served as the inspiration for garden design throughout the Muslim World and was also used in Islamic architecture. They attempted to replicate Paradise on Earth.

From India in the east to Spain in the west, the influence could be seen. The design variations are derived from the existing regional differences.

2.2KEY PARAMETRES FOR THE DESIGN

1. Site and Climate
2. Planning of building to provide thermal comfort
3. Aesthetic Elements for user group to enhance the experience.

CASE STUDY 1

3.1 THE TAJ MAHAL



Figure 4 TAJ MAHAL

Taj Mahal needs no prologue it's an authentically well- known monument and according to the French sightseer Bernier it deserves much further recognition than the pyramids of Egypt. The complex was erected by Shah Jahan (1592- 1666 communiqué), the Mughal Emperor of India, as a commemorative to his dead lady, Mumtaz Mahal (1593- 1631 communiqué), supposedly as a deathbed pledge “that he should make such a tomb over her, the like of which wasn't to be establish anywhere otherwise” In terms of tomb architecture, the Taj Mahal was not an invention. Since the fifteenth century, prototypes of Mughal mausoleums of this type, such as Sikandara Tomb and Humayun Tomb, have been assembled. The only difference is the placement of the tomb, which differed from all previous grave prototypes. The tombs of Ulugh Beg and Humayun were traditionally placed in the center of the garden, whereas the tomb at the Taj Mahal was located at the far end of the garden. This implies that the garden played a larger role in the overall architectural concept.

CONCEPT OF CHARBAGH SYSTEM

A Paradise Garden was based on the classic Charbagh design, with water channels dividing the garden into four sections; the four water channels representing the four rivers of paradise, as described in Islam as water, wine, milk, and honey. The garden was designed using the mandala concept, which means "wholeness," and the source of energy is in the center of the Mandala. Water is the equivalent of this energy source. This water of life must be channeled and distributed to all parts of the garden in a balanced and harmonious manner for the garden to flourish.



Figure 5 Evolution of Mughal Garden

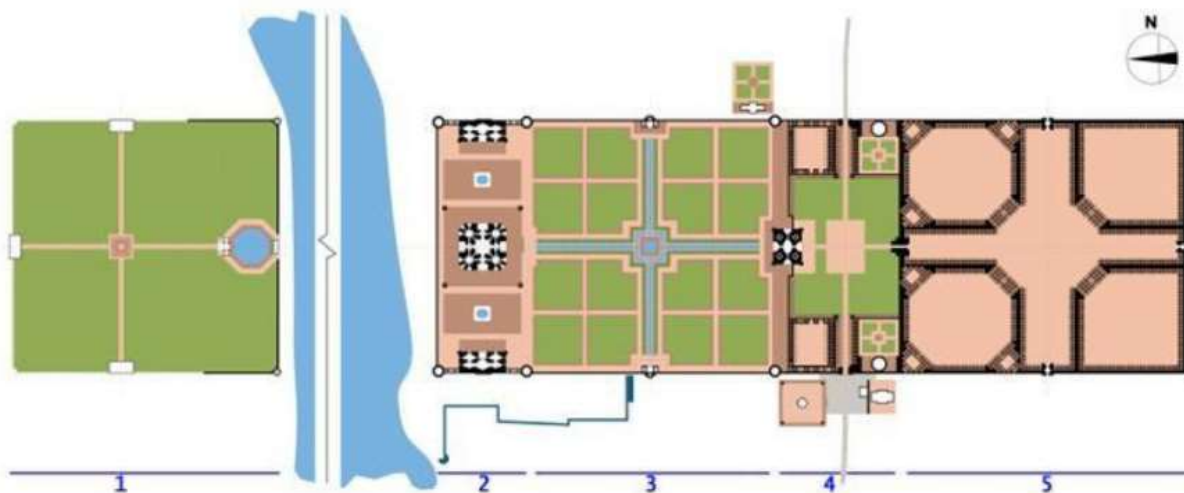


Figure 6 Plan of Taj Mahal

SENSORY EXPERIENCE OF THE TAJ MAHAL

The garden was built in the concept of mandala which means “*wholeness*” and at the center of the Mandala is the *source of energy*. the source of this energy source is water. For the garden to flourish, this water of life must be channeled and distributed to all parts of the garden in a balanced and harmonious way on one of the philosophies from the holy book Quran *Tawhid* and *Iqtisad* that is garden acts as a gathering space, and it should have harmony between the functional and spiritual elements.

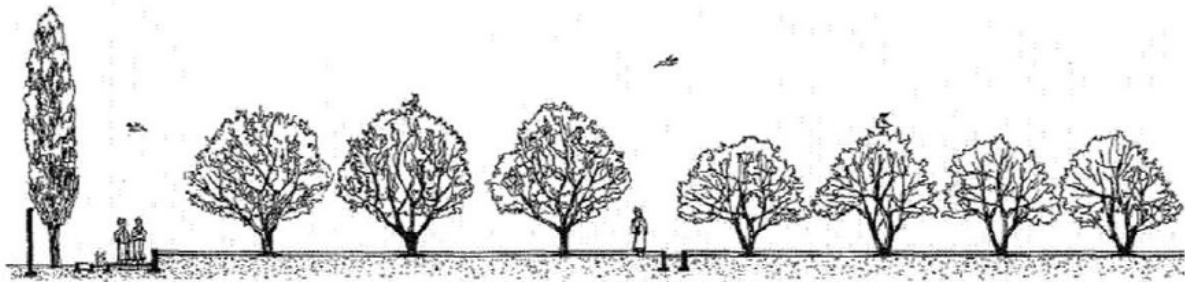


Figure 7 Elevation of Garden highlighting vegetation

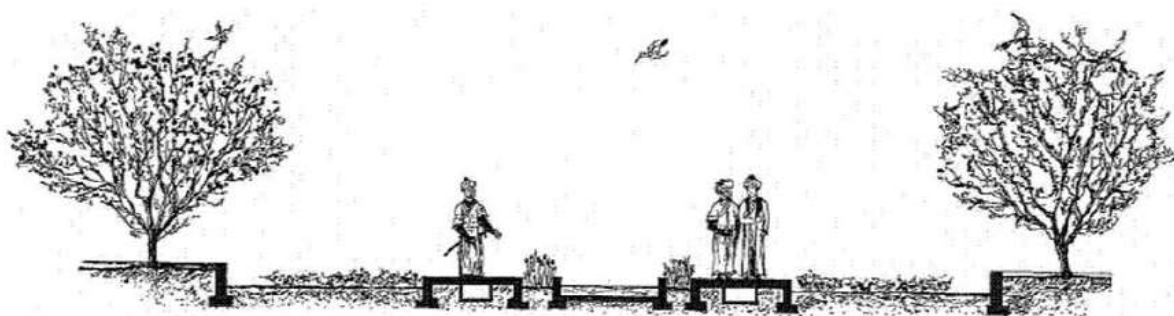


Figure 8 Elevation of water channels in garden

Mughal gardens created for entertainment, enjoyment, and hosting Court. The Gulistan is a space designed for the visual and olfactory delight of many-colored flowers. Flowers can be used to conjure Persian rugs in artwork by invoking different colored carpets. The Bostan, which literally translates to "vineyard gardens," is a more practical interpretation of Islamic gardens. They serve the dual purposes of providing fruit and shade to onlookers. These gardens were created around the moguls' mausoleums and were accessible to the public and tourists.

For improved outdoor spaces and improved vapor-transpiration cooling, greenery was incorporated. Vapor-transpiration increases the amount of water vapor in the atmosphere and lowers its temperature. As Agra has a composite climate and particularly hot, dry summers, water bodies (both still and moving) were placed to the palaces to regulate the moistness throughout the summer.

Springs are the best approach to improve the quality of the air because they scatter water drops into the air and hasten the evaporation process. In the Mughal constructions, spring was also utilized. These waterways and springs are continuously erected outside the buildings. The "channel of paradise," or Nahar-i-Bahisht, is an example of a water channel that travels through interior areas Of the structure to modify internal ambience.

Embracing the five senses, every space within the formal garden is endued with the delicate sensations that we come across to have lost in this fast- paced period. The brief and the eternal are both essential to the composition of spaces. murk, light, petals, leaves and water in stir are rounded by the reliability and chastity of created forms. The ingenuity of Mughal architects is legendary. Architecture would only be the mixing and combining of various materials without aesthetics. Art is therefore the spirit and soul of building. Mughal architecture is a prime example of the aesthetic experience inspiring "Feeling of Wonder" Mughals demonstrated exceptional skill in fusing local custom with Islamic principles. A crucial component of Asian culture and architecture has always been water. In both the Mughal Garden and our ancient constructions, water is a common architectural element. On a scorching summer day, water not only gives yielding cooling but also delights the sight.

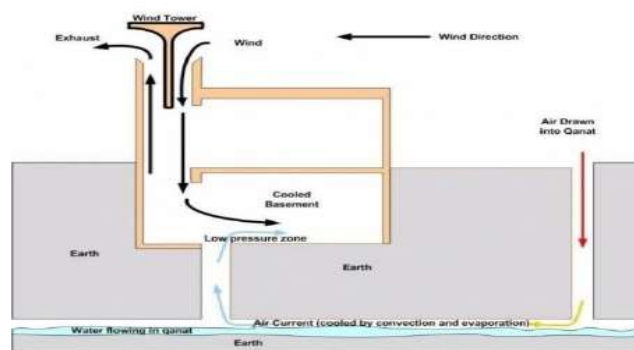


Figure 9 Water Channel



LAHORE FORT PAKISTAN

3.2 LAHORE FORT



Figure 10 Lahore fort, Pakistan

One of the most majestic buildings of its sort in the world is the Lahore Fort. It has been a representation of the megacity's most immediate days, emerging from the north-west of the walled city. In the unlikely event that it could speak, it would relate comparable experiences that would charm the audience. It might discuss the love, sentiment, and endeavor of gloomy-eyed prodigies and furious-bowed soldiers, monarchs in flowing silks and lords in sparkling defensive subcaste, writers, entertainers, slaves, and concubines, fighters, and their descendants, metamorphoses, and court interest, crowning observances and deaths, foul play, and dark retribution.”

The walled megacity's northwest region includes the Lahore Fort, which is situated on the left bank of the river Ravi. The Point is perfectly situated at the intersection of the old east-west outback route linking Kabul with Delhi and the ancient north-south riverine route that ran like the swash Ravi.



The Lahore Fort is primarily the most important location to study Mughal architecture because it has buildings from Akbar's through Shah Jahan's reigns. It covers the entire history of architecture, starting in the 10th century and ending with the British takeover of Punjab and the eradication of the Sikhs.

There are five main quadrangles in Lahore Fort.

- Diwan-e-Aam quad
- Moti Masjid Quadrangle
- Jahangir's Quadrangle
- Shah Jahan's Quadrangle
- Paien Bagh quadrangle



Figure 11 Plan of fort



SHAH JAHAN'S QUADRANGLE



Figure 12 water chamel in fort

An open court surrounded by Shah Jahan-era buildings on all four sides is located west of the Jahangir quadrangle. As a result, it is referred to as Shah Jahan's Quadrangle and has some of the most stunning locations that represent the pinnacle of Mughal architectural design. Shah Jahan is regarded as the king's builder and, thanks to his generosity toward palaces, castles, tombs, and other structures, he might be considered the pinnacle of Mughal architecture. He oversaw the Mughal architecture's transition into its classical era and gave it a new style.



Figure 13 water channel upon king throne



Cover Page



DIWAN E KHAS (HALL OF SPECIAL AUDIENCE)

It is situated in Shah Jahan's quadrangle's northern quadrant. This building was constructed around 1645 AD. This elegant kiosk is 53' x 51', with 20 bases and 4 elevations in height, and it serves as the ideal example of tasteful Mughal architecture. It was set up on a high platform that exuded freshness and lightness thanks to the grills that faced the sea and had apertures all around them.

KHAWAB GAH E SHAH JAHANI (SLEEPING CHAMBERS OF SHAH JAHAN)

It is situated south of the quadrangle of Shah Jahan. The Shah Jahan sleeping chambers are what they are called. The Khawab Gah contains five roomy apartments that are arranged in an east-west manner across from the Dewan e Khaas and have big, multi-cusped arched entrances on the front. Only the wall foundations visible at the primary location through the root of the barrel remain after the projecting veranda on the northern side was removed.

Lal Burj (Red Pavilion)

On the northwest corner of Shah Jahan's quadrangle, it is situated. The summer kiosk has eight sides. Its construction lasted from 1617 to 1631.

The Hammam e Shahi

The royal bath, known as the Hammam e Shahi, is situated to the west of Shah Jahan's bedroom quarters. It is a one-story building with a longitudinal axis that is symmetrical.

Khana Khilwat (Room of seclusion)

The Mughal emperor, according to conventional tradition, did not reside in the cathouse but rather in a separate court next to it. Shah Jahan built it in the year 1633. Two passageways separated Khilwat Khana's court from one another.

First, Paien Bagh (South)

The main feature of this garden was the availability of several paved pathways and trails. a spacious platform running through the

Emperors' Private abode (North)

A small door opening from the garden areas leads to the touching another court which has a small but elegant curvilinear kiosk on the north. A deep tank with a fountain is set in the center.

Scenic and Scientific Representation of Water

The architecture of any time depends on two main conceptions

- a. The demands of the people
- b. The idea of beauty prevailing during that period



Cover Page



Kant proposed that, like moral and intellectual understanding, beauty is a unique and self-governing use of the mortal mind. The Mughal architecture is renowned around the world, among many other reasons, because it was the result of experiments based on the study of figure, hydraulics, and other erecting scenes. The Akbari era saw the height of new eras in refinement, but Shah Jahan's aesthetic and architectural traditions made waves. The eye is additionally gratified right now by the eye-catching and magnificent creative and nonfictional constructions as well as the services. The landscaping of Mughal monuments is an essential component. Trees, greenery, and water features near the building improve both the physical comfort and the enjoyment. Mughals shown great skill by implementing Islamic principles. Mughals demonstrated great skill by fusing Islamic principles with ancient customs. They promoted landscape design by utilizing hydraulic characteristics. Researchers, geographers, and experts in microclimate control claim that water bodies like springs and streams

To change the interior landscape, channels were added to the structures that pass through the internal structures. In hot and dry conditions, water evaporation is beneficial since it increases the level of moisture. The air temperature of a microclimate is moderated and regulated by water. It has a far higher thermal storage capacity than building materials like brick, concrete, and gravestone. Additionally, it cools the environment. Evaporation absorbs the heat from the air and significantly cools the environment. In both approach and science, wind direction is an important consideration. With changes in rainfall, Lahore's wind direction changes. When no one is around, it goes from Northeast to Southwest. It changes in the summer, going from the Southwest to Northeast.

Our historic buildings and the Mughal gardens both make extensive use of the architectural element of water. On a scorching summer day, water not only looks nice but also offers unbeatable coolness. Water increases physical comfort by cooling the surrounding air through evaporation. The area of water in contact with the air and the precise zoning of the sheltered places, which allowed for the placement of strips of water strategically throughout the structure, determine the rate of heat loss from the moving air.

The summer heat is reduced by a water pool in the center of the court with maximum boundaries that stores solar energy. Limited but fresh nature is provided by this pool, coupled with gardens, trees, and the endless sky. A cooling impact on the structures can be produced by evaporation from the surface or from internal objects, which lowers heat. In Mughal architecture, evaporative cooling also makes up the inside environment. It has not been a component of outdoor areas. The procedure is straightforward: air passing over water generates evaporation, which then absorbs heat and cools the air, adding moisture to the atmosphere. The goal is to breathe over the water pools before entering. The pool or root is positioned in the middle of the yard or the structure to improve the process. In the middle of the quad are the springs. Before entering the Khilwat Khana, air flows over the springs' water, absorbing the heat and channeling the breath. In the sweltering summers, the cool air that enters the Khilwat Khana does have a cooling impact. The yard's central water feature, which has the greatest amplitude, stores energy, and reduces summertime heat. The



Cover Page



water pressure was maintained by salsabil. It forces the water to come out of the fountainhead. For beyond the cerebral effect, the sound of the water has a soothing and comforting effect, more significant in mortal comfort related with the capacity to balance and reduce environmental temperature

On earth, there are many representations of heaven. Another of them is "Water." Due to its stagnancy, the pool's water mirrors the sky. It is the only site on Earth where we can appreciate the richness and detail of a sky without a horizon.

The line separating the sky and the earth is absent in the calm and impassive sea. Water has a considerable impact on the mortal's audile and visual senses in addition to their psychology or aesthetic sense. "Other advantageous and useful features of pools are the acoustic and underwater parcels of water. A fluid like water has the capacity to significantly lower the amount of acoustic energy it generates during oscillations. In fact, the pool's presence serves as a protective buffer against outside noise. There are often some springs in the square because of the way that water's magical power manifests itself in both sight and sound pools where water naturally falls because of the water's different positions and gives a pleasing sight and sound. The cradles in front of Khawab Gah and Diwan e Khas help to maintain a tranquil visual and mental environment by regulating the temperature and allowing cool air to blow. These are positioned between passages of wind that are coming from and going to provide the residents with a tranquil and pleasant atmosphere. Water, plants, sun, wind, and other elements of nature all provide euphonious and amiable effects.



Figure 14 water axis



Cover Page



COMPARITIVE ANALYSIS

CASE STUDY	SITE CONTEXT	PLANNING/ LAYOUT	SENSORY ELEMENT	INFERENCES
TAJ MAHAL, AGRA	Semi-arid land with warm climate	Symmetrical plan with Charbagh system layout Garden with mausoleum at the end	Geometrical figures, fragrant flowers, fruit bearing trees, water, white marble	As compared to other Mughal works taj has superior proportions and is exquisite. Water is key element in design Charbagh system garden and moonlight garden creates sensory experience for the user
LAHORE FORT, PAKISTAN	Semi-arid land with warm climate	Symmetrical plan with Charbagh system layout Garden with different places for accommodation for royal family	Geometrical figures, fragrant flowers, fruit bearing trees, water, sandstone wood, water fountains and channels in indoor spaces	Thermal comfort The architecture of any time depends on two main conceptions The demands of the people The idea of beauty prevailing during that period



Cover Page



CONCLUSION

Islamic architecture as well as the design of gardens all around the Muslim world were influenced by the Holy Quran's description of Paradise. They tried to create Earthly reflections of paradise. From India in the east to Spain in the west, the effect could be felt. The variances in the design come from the native distinctions that exist. The design of spaces then developed out of a particular matrix of Islamic laws that established the limitations of garden design.

Although the technique and typology of gardens used by the previous inhabitants of Persia and Arabia remained unchanged, nature was nevertheless oriented toward the principles set out in the Holy Quran. It can also be argued that the development of Charbagh was not solely an Islamic idea because the earlier inhabitants of the region were aware of the value of using rare water to irrigate their parched fields.

The design of the Charbagh could have been completely different from that of the Paradise Gardens; yet, while the dominant religion altered the philosophy, the basic elements of design remained the same.

The architects and planners for the design of buildings may use the environmental advancements in Mughal structures as principles or recommendations. These ideas could be refined and combined with cutting-edge technology to encourage harmony between people and the natural world.

As Fathy said, *“The principles that produced the traditional solutions must be respected. This is the only way modern architecture can surpass, in human and ecological quality, the achievement of vernacular architecture in the hot arid regions of the world”* (Fathy, 1986).

Water can be used as a component in architecture where it compromises the requirement to favour a space with its best aspect, making it one of the basic and essential elements in changing the visual perception and microclimate, which in turn favours sustainability aspect consideration and its implementation. Various aspects of psychological healing and impacts on senses have also proven to be with positive results, so the study gives the basic analysis where water can be used as a component in architecture.

I'll leave you with a citation from Craig S. Campbell's book *Water in Landscape Architecture*. *“In quiet ponds, lagoons, canals, or lakes water presents an entirely different set of moods, sounds, and settings than water in motion. Water in repose is usually associated with meditation, contemplation, poetry, and music; a setting for love or laziness; a time and place for recharging...”*



Cover Page



References

1. Kiss and A. Reith, "Architectural and urban design tools for reducing energy consumption in cities," *Pollack Period.*, vol. 8, no. 3, pp. 151–161, 2013.
2. Sz. Portschy, "Community participation in sustainable urban growth, case study of Almere, The Netherlands," *Pollack Period.*, vol. 11, no. 1, pp. 145–155, 2016.
3. Z. Ryan, *Building with Water: Concepts Typology Design*. Birkhäuser Architecture, 2010.
4. O. Herwig and A. Thallemer, *Water: Unity of Art and Science*. Arnoldsche Verlagsanstalt, 2008.
5. *Ned Kahn Studios*
6. M. Fazio, M. Moffett, and L. Wodehouse, *A World History of Architecture*. Laurence King Publishing, 2013.
7. Lohrer, *Basic Designing with Water*. Birkhauser, 2008.
8. Irving, Ed. *1001 Buildings you Must See before you Die*. The World's Architectural Masterpieces, Universe, 2007.
9. N. Spiller, *Digital Architecture Now*. Thames & Hudson, 2009.
10. Wylson, *Aquatecture: Architecture and Water*. Architectural Press, 1986.
11. M. Prominski, A. Stokman, S. Zeller, D. Stimberg, and H. Voermanek, *River, Space, Design*. Birkhauser, 2017.
12. Amoozegar, J., 2001, *Mythical History of Iran*, fourth edition, SAMT publishing, Tehran
13. Omid, Masoud, 2007, *ontology of Sheikh Eshragh*, Bashgah-e-Andisheh Publishing
14. Behbahani, Akhavan Abdulhadi, 2003, an article about role-playing of water in Sumerian and Babylonian
15. myths ", Mah-e-honar book, Issue 57
16. Boorian, Muhammad Ali, 2010, *Elements of the Philosophy of Eshragh from the viewpoint of*
17. Suhrawardi, translated by Mohammad Ali Sheikh, Shahaid Beheshti University publication
18. Poordeimi, J., 2008, *the impact of daylight to perception of human*, Saffe publication.
19. Tadayon, Ataullah, Suhrawardi 1988, *Sheikh Eshragh Madih saraye noor*, Tehran Publishing
20. Jvaheri, Parham and Mohsen, 2001, *Solution of water in Fars history*, the Iranian National Committee on
21. *Irrigation and Drainage*, Water National Treasure of Iran, Tehran
22. Dibaj, M., 2005, *Space of light and architecture of lighting*, baghe nazar juurnal, the second year.
23. Danesh doost, yaghoob, 2007, *Article of Iranian garden*, Asar Journal, Cultural Heritage Organization of
24. Iran, Tehran
25. Razi, H., 1992, *Ayine mehr, Mithraism*, first edition, Bejjat., Tehran.
26. Sadat Akhshik, S O., 2011, *Consideration of status and effect of color and light Symphony in Postmodern*
27. *architecture of libraries*, Shamse magazine, Volume 10, Number 3 11
28. Soltanzadeh, h., 2009, *lighting and architectural lighting*, architecture and culture journal, 10th year, Issue thirty-fifth
29. Alam-ol- Hoda, Hoda, 2003, article "Water in Iranian architecture" *Book of Mahe honar*, No. 58-57, Tehran
30. Barzl, Amnon, 2008, *Introduction to the Art of Light*, race, Art Journal
31. Pyytra, Rojin, 2006, *Women Philosophers in ancient Greece and Rome*
32. Salimi, Amineeddin, 2015, *Investigating on the Interior Space Quality Affecting by Light and Color*
33. Shultz, Christian, 2002, *architecture: the meaning and place*, O.