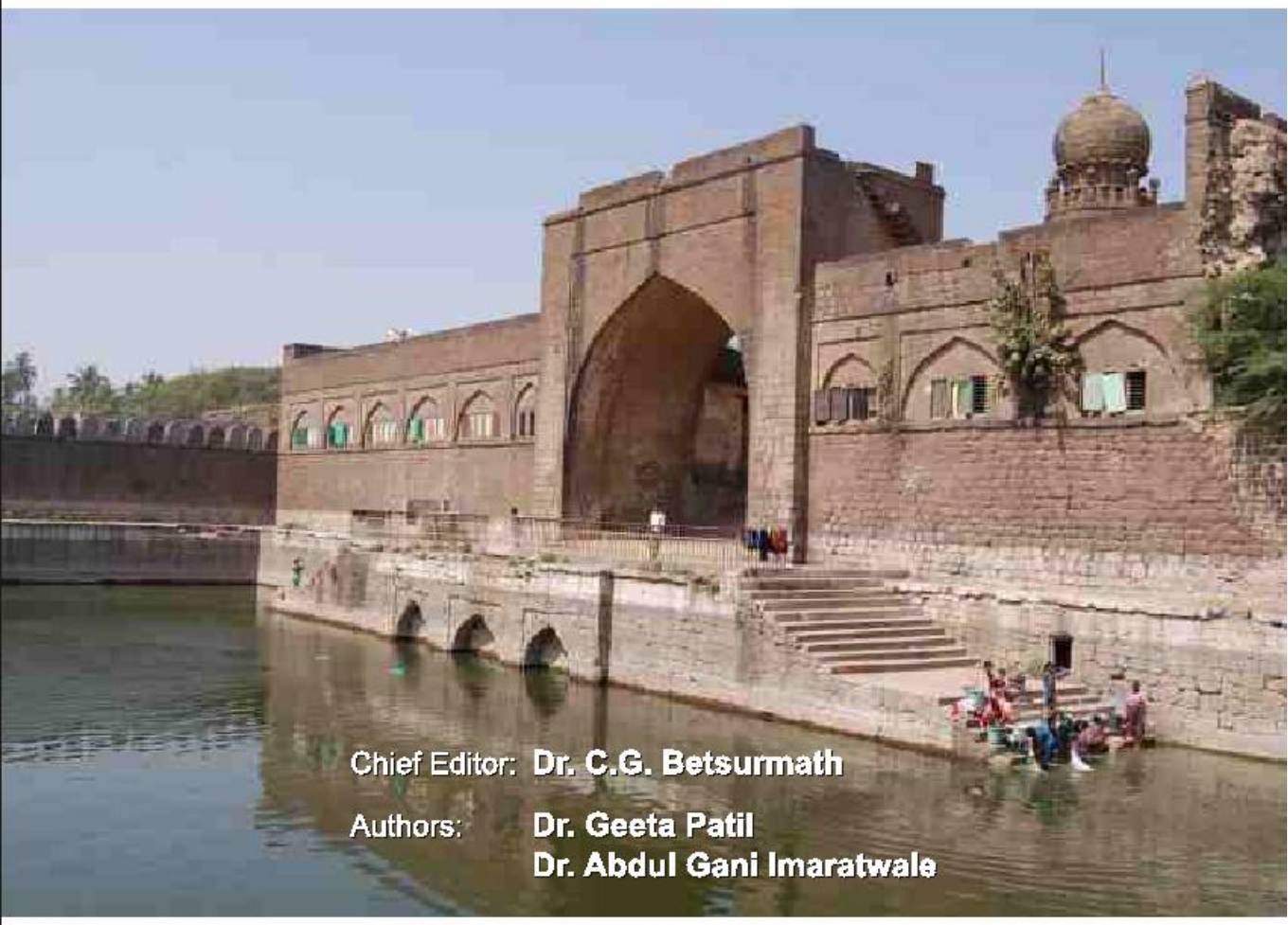
Bijapur Water Works With Special Reference to

TAJ BAUDI



Chief Editor: **Dr. C.G. Betsurmath**

Authors: **Dr. Geeta Patil**
Dr. Abdul Gani Imaratwale

DEPARTMENT OF ARCHAEOLOGY, MUSEUMS AND HERITAGE
MYSORE
2014

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Chief Editor

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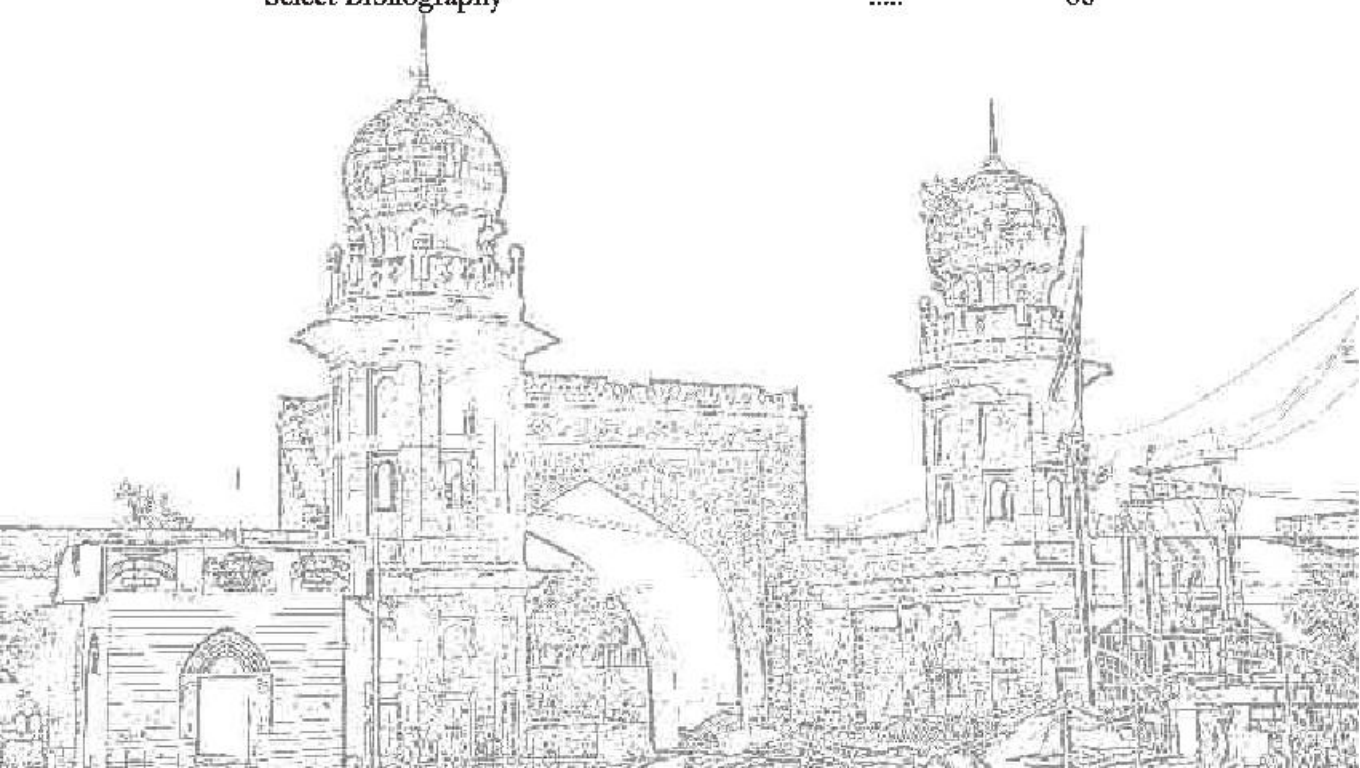


Gateway of the Taj Bauri, Bijapur in 1885

FOREWORD

It is an excitement to me to write up the Foreword to this book penned by Dr. Geeta Patil and Dr. Abdul Gani Imaratwale, who are well known environmental scientist and Deccan historian respectively. They took a lot of efforts to rewrite the history of Bijapur especially the water works with correct facts and figures based on authentic source materials available in Bijapur, Hyderabad, Maharashtra, etc.

The history of Bijapur is a unique chapter in the history of India. The capital city of Bijapur acclaimed an international status during the medieval times. It was the onetime capital of the Adil Shahi Sultans wherein dotted the mosques, mausoleums, graceful minarets, palaces, forts, watch towers, gateways, water tanks and its unique culture steeped in the history of Deccan. That is why it is rightly said that, 'if you throw a stone into Bijapur, it can only land on a historical monument'.

Under the 200 years of Adil Shahis' rule Bijapur had tremendously grown, and it became a great center of culture, trade and commerce, and art and architecture. As it flourished in all the walks of life, many scholars, poets, painters, dancers, calligraphers, musicians, Sufi saints and other men of art and letters flocked into Bijapur. It also advanced very much in the field of ecclesiastical matters, education and learning, therefore it was considered to be the 'Second Baghdad' in the Islamic World.

Remarkably this city even to this day retained greater part of its monuments which included the forts, mosques, shrines of the Sufi saints, mausoleums of the kings, water system, etc. that are most attractive in artistic sense in general, but a few of them to say the water systems are utilitarian in nature rather than attractive. This work titled 'Bijapur Water Works with Special Reference to Taj Baudi' by Dr. Geeta Patil and Dr. Abdul Gani Imaratwale is a unique attempt to explore the presence of science and technology and their application during the Adil Shahi regime.

The book throws light on the engineering work existed during 16th & 17th century AD. and narrates that in the city of Bijapur, presently known for scarcity of water, how every nook and corner were supplied with the plentiful of water. To meet the water requirements of the public in and around the city the Adil Shahi government exhibited an extraordinary engineering work and constructed as many as Baudis at various places. Among them, the notable construction is 'Taj Baudi' a water tank that commemorates Taj Sultana, who was the favourite queen of Ibrahim Adil Shah II.

The authors say that the Taj Baudi never went dry so far, if its water is cleaned through chemical and biological process, then it can be useable and it is enough to meet the water requirements of the whole city of Bijapur today. The work also revealed the pathetic condition of the age old monument and its tangible heritage and utilitarian value. I hope this work will open the eyes of the authorities concerned, and it is their duty to bring back Taj Baudi's original beauty and utility.

With an intention to make justice to the contribution of the authors I would like to respectively single out them;

Dr. Geeta Patil, an eminent environmental scientist and a writer, has conducted specific researches on the Bijapur water works, most particular of the major Baudis with the environmental status of the historical importance of Bijapur. This contribution has made her an unique scientist in exploring the scientific knowledge of the Adil Shahis' past. Her renderings like the interdisciplinary research, application of science and technology to the art and architecture and creation of scientific hypothesis made her scientific scholar. The exploration of the knowledge of the biodiversity during the period of the Adil Shahis is her greatest contribution.

Dr. Abdul Gani Imaratwale, a specialist in medieval history of Bijapur, has already enriched the history lovers by his books, articles, speeches and presentations in the subject of the Sultanate's period. As a result many Indian and foreign scholars referred his name in their works that have been published in indigenous and foreign journals and magazines; and that exposed him internationally as a treasury of living source for writing up the medieval history of Bijapur. He has written many books and articles in English and Urdu which illuminate the dark areas of the history of the Adil Shahis, and he terminated many doubts that germinated in our minds about Bijapur's past. In this context his writings are important contribution to the history of Deccan in general and the Adil Shahis in particular.

I wish all the best to the authors, and expect more from them that in future, other than the Bijapur historical issues they will also undertake research tasks from the histories of the Deccan.

Prof. M. Maheen
Head, Dept. of History & Archaeology,
Anjuman-e-Islam's Arts and Commerce College, Belgaum

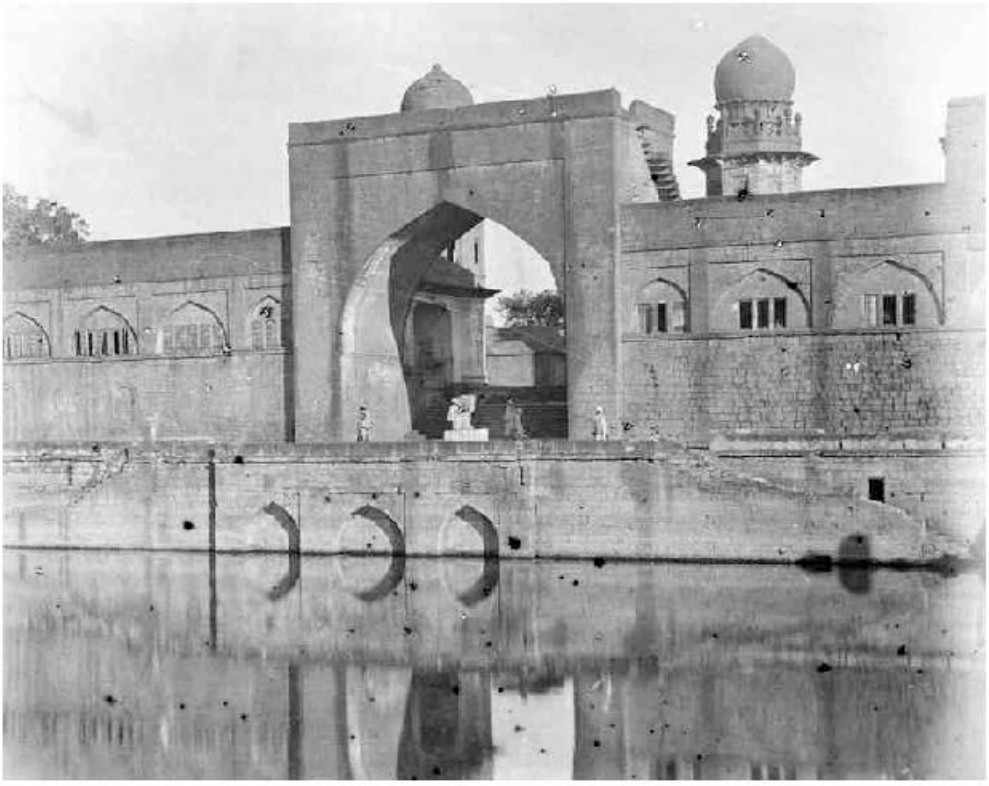
PREFACE

On the virtue of being a citizen of Bijapur for about six decades I got an opportunity to closely observe almost monuments of Bijapur and chanced to study them intensively. So far my knowledge goes, the most important books of Bijapur history and architecture written in the colonial period are of Meadows Taylor's 'Architecture at Beejapoor' and Henry Cousen's 'Bijapur and its Architectural Remains. Even to this day these books serve as first hand primary sources ever published. In addition, they are some part renderings by the colonial and the Indian writers, who picked up very important titles and subject matters from the history, culture and heritage of Bijapur, by studying them one could get glimpse of Bijapur's overall history. These works also make the research scholars to develop a proper understanding and insight in studies of medieval Bijapur, minus them they cannot move forward in realization of their academic pursuits.

The present work 'Bijapur water works with special reference to Taj Baudi' is of equal grade and importance as of the above mentioned works. It is believed that this work too will help to understand Bijapur's erstwhile great past. The novelty of the work is the amalgamation of scientific knowledge with history. The approach of the authors to the research problem is commendable and highly applausive.

The authors Dr. Geeta Patil and Dr. Abdul Gani Imaratwale deserve to be congratulated for this marvelous piece of academic work that will remain and continue to enjoy as the foremost scientific work of hydraulic remains of the Adil Shahis of Bijapur. On behest of the fanciful admirer and lovers of Bijapur history and heritage I anticipate such further works from their pen in forthcoming days.

Prof. S. B. Patil, M.Sc., Ph.D.
(Hydraulic Conservation Activist)



Taj Bauri, Bijapur in 1885

ACKNOWLEDGEMENTS

As the authors of this work we must discharge the debt of gratitude and thanks incumbent on us. We are deeply beholden to Dr. C.G. Betsurmath, *Commissioner for Archaeology and Heritage, Government of Karnataka,* Sri. K.R. Ramkrishna, *(Ex. Commissioner)* and Dr. R. Gopal, *Director for Archaeology, Government of Karnataka.* We can never repay the debt of gratitude that we owe to them. They initiated and encouraged us to undertake an original research work like the present one.

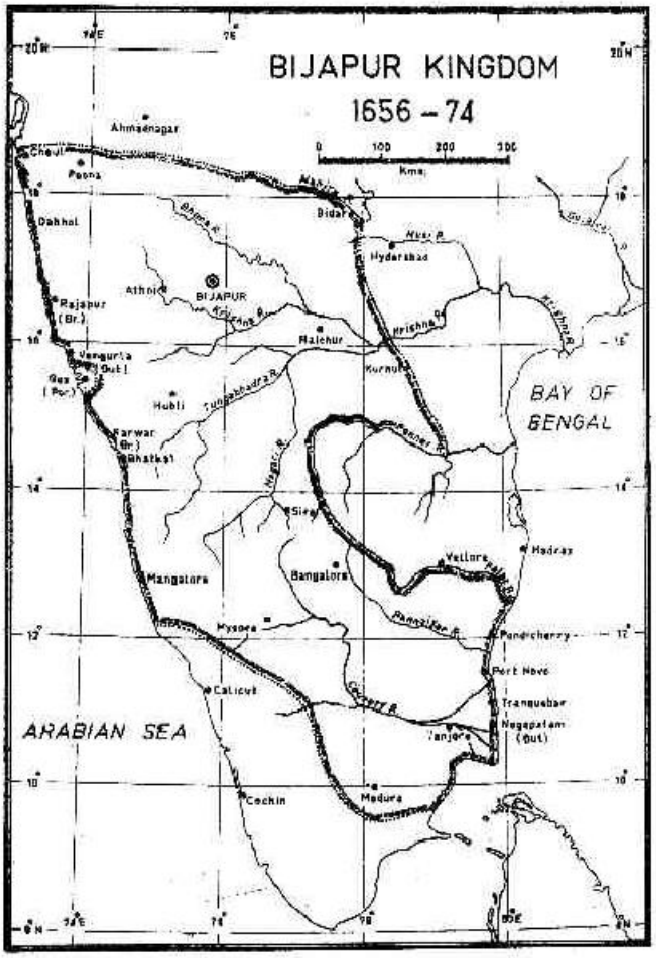
We have been greatly benefited from our doyens Dr. Mustaq Ahmad Khan Risaldar, a renowned Consulting Physician of Savanur (Shahnoor) and Janab Mujtaba Husaini Jahagirdar, the Religious Head of the Shrine and Hospice of Hazrat Pir Maabari Khandayat and Chin Maabari Khandayat of Bijapur. The enlightening discussion in regard to the ecclesiastical and philosophical issues with them encouraged us in many respects. We are extremely grateful and indebted to them.

Our heartfelt thanks are due to our friends Klaus Rotzer, Dr. Sujeet Nayan, ASI, Museum Section, Bijapur and Shri Anand Tirth, ASI, Monuments Section, Bijapur from whom we have received much valuable help and assistance in carrying out this work. Similarly we are thankful to Janab: Israrulla Fatehpur, who whole heartedly assisted us in proof reading of the text, arranging the photographic plates, etc. His assistance we consider is of a great value. Further, we are thankful to Melukote N. Muralidhar and Mr. Rafiq Ahmad Jamkhandi, the photographers of high eminence, who readily made available themselves to us as and when we called them.

We can never forget the valued services of members of our families viz. Dr. S.B. Patil, Dr. Ritiha Patil and Mr. Hrishikesh Patil; and Mrs. Bibi Asma Imaratwale, Mr. Abdul Qadir Imaratwale, Ms. Bibi Aayeesha Imaratwale, Ms. Zeba Kulsum Imaratwale, Ms. Farzana Maria Imaratwale, Ms. Hiba Fatima Imaratwale and lovely Bibi Barira Imaratwale. They lent their sublime support, fully backed us and patiently borne with us the stress and strains involved in the research. Here we take this opportunity of expressing our sincerest thanks to them as they helped us in some way or the other in our task.

Lastly, we sincerely acknowledge and express our indebtedness to the officers and members of the staff, the Department of Archaeology and Museums, and the other persons, who directly and indirectly helped and assisted us during the course of our research, and making out of the present volume.

Dr. Geeta Patil
Dr. Abdul Gani Imaratwale



Chapter-I

Introduction

On account of various political and ethnic causes, a powerful Bahmani kingdom of the South India began to show its weakness from the last quarter of the 15th century itself. In consequence the process of its disintegration had begun and by the end of the first quarter of the following century there born eleven principalities headed by the provincial chiefs, formerly working under the Bahmanis. Out of these eleven principalities, the five powerful viz. the Adil Shahis of Bijapur, the Qutb Shahis of Golconda, the Nizam Shahis of Ahmadnagar, the Barid Shahis of Bidar and the Imad Shahis of Berar grabbed the six less powerful states. Thus the five Sultanates rose from the last quarter of the 15th century and by the end of 17th century their fate was sealed one after another. The Nizam Shahis annexed Berar in 1574, the Adil Shahis conquered Bidar in 1619, further in league with the Mughals, the Adil Shahis partitioned the kingdom of Ahmadnagar in 1635-36, at last Emperor Aurangzeb captured Bijapur in 1686, and in the following year Golconda succumbed to the Mughal might. The capture of the last two powerful Deccani Sultanates by Emperor Aurangzeb partially fulfilled his dream of the conquest of the Deccan.

In the Deccan, of course, the five kingdoms of Bijapur, Golconda, Ahmadnagar, Bidar and Berar suffered, as far as political conditions are concerned, from one great disadvantage, namely, that of internal dissension, but in the matter of promotion of art and culture, this factor was more than counterbalanced by their contributions to the development of civilization in the Deccan in particular and India in general. In this connection Dr. Nazir Ahmad rightly pointed out, "the monarchs of the Deccan, particularly the Adil Shahis Sultans attempted to evolve a distinct culture based on a unity of indigenous and foreign traditions which resulted in the transformation of the entire fabric of common life of the people. Ultimately they succeeded in bringing about a cultural renaissance in the Deccan with universal and popular appeal". The Adil Shahi society was of cosmopolitan character composed of the people belonging to different religion, castes or ethnic groups. In the kingdom the Hindus and Muslims formed a bulk of population. Among the former mention may be made of the Brahmins, Kyastha Prabhus, Lingayats and others. The latter composed of the

Gharibudiyars (foreigners of Perso-Turkish origin), the *Deccanis* (the old Arab settlers, the deserters from the imperial rule of the Tughluqs and the Khaljis and, the local Muslims and the new converts from the native lots), the *Habshis* (the immigrants from Abyssinia or the African continent) and the *Hindustanis* (mostly Afghans, who migrated from the north to the Deccan from the time of the Sayyed, the Lodhi and the Mughal rule up to 1686-87). A considerable size of the Jaina population also dwelt in the kingdom, and with regard to the Buddhist, we find no clear trace in the medieval evidences. It is possible that they might have lived with an eventful life. The Christians and the Jews mostly concentrated in the coastal towns. A small chunk of population of new converts to Christianity could be noticed in Bijapur, Raichur, Mudgal and Naldurg towns. They hardly had any impact on the general social life of the people. On par with the Muslim and the Hindu religious places the Christians received the endowments of fertile lands that exempted from certain taxes, for upkeep of their ecclesiastical establishments.

Most particularly among the five Sultanates of the Deccan, the ruling dynasty of Adil Shahis of Bijapur stood high so far as the political and cultural achievements are concerned. Their cultural contributions led to the creation of an original and unparalleled culture in the Deccan called 'the Bijapur Culture'. According to Professor B.D. Verma, "the Adil Shahi kings largely contributed to the progress of Indian civilization by their generous patronage of literature, architecture, music, calligraphy, paintings, etc. in fact, self effacement in the cause of their country was the be-all and end-all of their lives; they poured their heart and soul into their country". In all, nine Sultans ascended on the Bijapur throne from the inception of the dynasty in 1489. Their names are as under;

Yusuf Adil Shah	1489-1510
Ismaeel Adil Shah	1510-1534
Mallu Adil Shah	1534-1535
Ibrahim Adil Shah	1535-1558
Ali Adil Shah-I	1558-1580
Ibrahim Adil Shah-II	1580-1626
Muhammad Adil Shah	1626-1656
Ali Adil Shah-II	1656-1672
Sikandar Adil Shah	1672-1686

Bijapur, the erstwhile capital city of the ruling dynasty still stood as testimony of the old glories what it enjoyed in the Medieval Ages in the Deccan. The city was a great centre of education and learning, trade and commerce, etc. Sometimes on account of its urban features like gardens, markets, town planning and civic amenities,

hospitals and public utility works it surpassed even the great cities of Delhi, Agra, and Lahore of the Mughal India. The foreign travelers and envoys like John Van Twist, Abbe Carre, Mandelslo, Jean Baptiste Tavernier, Baldeous, Ogilby and others, who either directly visited Bijapur or the Deccan, praised a lot the greatness of Bijapur in their travelogues.

With the fall of the Vijayanagar Empire in the Battle of Talikota in 1565, the Adil Shahi dynasty, then second biggest in the Deccan attained a measure of repose and complete freedom from the fear of annihilation. Among the confederate victors, Bijapur was greatly benefited from the spoils of war and in its further conquest in the ex-kingdom of the Vijayanagar. Thus, the Battle of Talikota made the Adil Shahis ample free from political apprehension, and it paved the way for its consolidation, enlargement and extension of sphere of influence in the Deccan. Ali Adil Shah-I expanded the Bijapur kingdom beyond Tungbhadra river in the south. Ibrahim Adil Shah-II occupied Bidar and made many southern Nayakas his vassals and Muhammad Adil Shah reduced the chieftains of the Carnatic and Malenadu. As a result the boundaries of the kingdom reached from the shores of the Arabian Sea, in the west to the Bay of Bengal, in the east. By the mid-17th century, Bijapur was the second biggest state in Indian sub-continent after the Great Mughals. Thus, in the south there remained almost no rivals of Bijapur as the Qutb Shahis were essentially peace-loving and seldom showed inclinations for aggrandizement, etc. and they proved to be sincere partner of Bijapur against the common enemy, the Mughals. The Barid Shahis were already conquered and the Nizam Shahis failed to compete with Bijapur on account of the ascendency of the weak rulers one after another, and that led to civil strife and downfall of the dynasty. Till the time the Mughals of the north actually began to plan to conquer the Deccan in the last quarter of the 17th century, Bijapur kingdom flourished in all respects.

In the present age the city of Bijapur is well known throughout the world on account of its gorgeous monuments. During the Bahmani rule in the Deccan, Bijapur merely was a town and the headquarters of its *Taraf* (province). But later, after the foundation of an independent ruling dynasty the town was known through its preceptors, the Adil Shahis. They made it the seat of their government, endowed and enriched it. From the accession of Adil Shah-I (1558-80) till the end of the rule of Muhammad Adil Shah (1626-56), about a period nearing a century, can be taken as the Golden Age of Bijapur architecture. As in this period various type of building projects were undertaken and completed to their total perfection. This period saw cropping up of a strong outer fort, the Great Jami Mosque, Gagan Mahal, Haft Mahal, Anand Mahal, construction of new parallel city of Nauraspur (in the west of Bijapur), great water works, Ibrahim Rauza, Golgumbad, Dad/Asar Mahal, etc.

During the time of the Bahmani kings, the Deccan developed the Muslim style of architecture. Most of the buildings of the Bahmanis have come up in this style. But from the inception itself the local architectural influences were making inroads that later became the important elements in the provincial architecture of the off-shoots of the Bahmanis. This mixed style of architecture attained eminence and a certain measures of perfection during the Adil Shahi period.

For perfect understanding of Bijapur's Indo-Saracenic style of architecture it is felt essential to discuss some important features of the Islamic architecture. The architecture that had been developed by the Muslims, after the foundation and extension of their empire in the different parts of Asia and some parts of Europe goes in the history of the building activities as "Islamic Architecture". Although Islam was born early in the 7th century in Arabia, but it was in the 8th century the Islamic Architecture began to appear. In this art of buildings the Syrians, Egyptians, Arabs, Turkish, Iraqis, Iranians, Afghans and others contributed.

The only building remained of the early Islamic age is *Kaaba* means 'cube' in Arabic, is a simple in appearance. Islamic Architecture is in part comprised of those buildings and built environments intended for use in Islamic worship, commemoration and instruction. Among the architecture of this group are;

Mosques,
Madrasas or convents
Mausoleums
Shrines or Dargahs, etc.

Islamic Architecture may also be considered as the creation of patrons and builders, who profess Islam or those that live in a region ruled by Muslims. These buildings can generally be described as secular and that included;

Suqs (market-places)
Hammams (public baths)
Khans (inns)
Caravan Sarais (roadside inns)
Palaces
Forts and citadels
Houses, etc.

The Islamic Architecture is infinitely varied in plan, elevation, building material and decorative programs, there are several recurring forms found in all types of buildings, be they religious, secular, public or private. These basic components are the domes, the arch and the vaults. During the Golden age of Islam that is when the architecture was

best developed, the Muslims had basically introduced the complex architecture, that had the following elements and forms;

1. Minarets or towers
2. Four *Iwan* plan that contained three subordinate halls and one principal one that faces towards Makkah
3. *Mihrab* or prayer niche
4. Domes or cupolas
5. Geometric shapes or designs, presentation of vegetations like flowers, buds, creepers, leaves, trees, landscapes, etc. and repetitive art
6. *Muqarnas* (unique Arabic / Islamic space enclosing system) were used for the decoration of domes and other places
7. Decorative Islamic calligraphy
8. Central fountain, wells, and in modern times the baths and lavatories, etc.
9. Bright colours were commonly used

In India the medieval period saw a great development in the field of architecture. With the coming of the Muslims in the sub-continent of India many new features came to be introduced in buildings. Before coming of the Muslim, in India there already existed what are known as Brahminical, Buddhist and Jaina styles of architecture. The Muslims also brought with them the arts of different parts of western and central Asia, northern Africa and south-western Europe. The mingling of the styles brought into existence a new style of Indian architecture. This style is entirely different in character from Islamic architecture in other Muslim countries. The amalgamation of the foreign and indigenous styles of architecture was made possible by certain factors;

1. The Muslims had to employ Indian craftsmen and sculpture, who had their own ideas about the form and method of construction and consequently they were able to introduce into the Muslim buildings their own ideas.
2. In the early decades of their rule, sometimes, the Muslims used materials of the Hindu and Jaina religious places. They were used in accordance with convenience to adjust their worshiping sites, and
3. Wherever the Muslims ruled they never hesitated to learn, and ever appreciated the potentialities of the subjects. Here in India too, they took influences from the Indians in many cultural aspects and they encouraged the development of syncretism, as such in the field of architecture they took best use of known technology of Indian skilled men.

The Muslims incorporated in their architectural style the native elements such as;

1. Decorative brackets
2. Balconies
3. Pendentive decoration
4. Kiosks *(Chatris)*
5. Tall towers
6. Half - domed double portals.
7. Geometrical and arabesque designs (except the living objects), carved on stone in low relief, cut on plaster, painted or inlaid

The development of Muslim style of architecture of the medieval period can be called the Indo-Islamic Architecture or the Indian Architecture influenced by Islamic art. For clearer understanding of this style the architecture of the medieval period can be divided into three categories;

1. Indo-Islamic architecture in Delhi Sultanate (the Slave; 1206-1290, the Khaljis; 1290-1320, the Tughluqs; 1320-1413 and the Sayyids; 1414-1451)
2. Indo-Islamic architecture in Mughal rule (1526-1707)
3. Indo-Islamic architecture in Provincial regimes (Punjab, Bengal, Jaunpur, Gujrat, Malwa, the Deccan; the Bahmanis of Gulbarga and Bidar, the Qutb Shahis of Golconda, the Adil Shahis of Bijapur, the Nizam Shahis of Ahmadnagar, the Barid Shahis of Bidar and Imad Shahis of Berar)

The Indo-Islamic architecture is also known by another name Indo-Saracenic architecture. It drew its inspiration from Syria, Egypt, Northern Africa and Sassanian Persia and its architecture acquired a fundamental character of its own distinguished by standardized forms and concepts.

Later the same style developed fusion with European architecture. Many European architects who arrived in India took the elements of the Indo-Saracenic architecture and applied the Gothic and Victorian styles. Gothic architecture flourished from the mid 12th century to 16th century, when many Europe's greatest cathedrals were under construction. Gothic buildings are characterized by jointed arches, flying buttresses, rib vaults, and ornamental stone tracery. Such features are often complemented by high quality standard glass and sculpture; while the Victorian architecture is related to the reign of Queen Victoria (AD. 1837-1901). Distinguished features of Indo-Saracenic architecture are mentioned below;

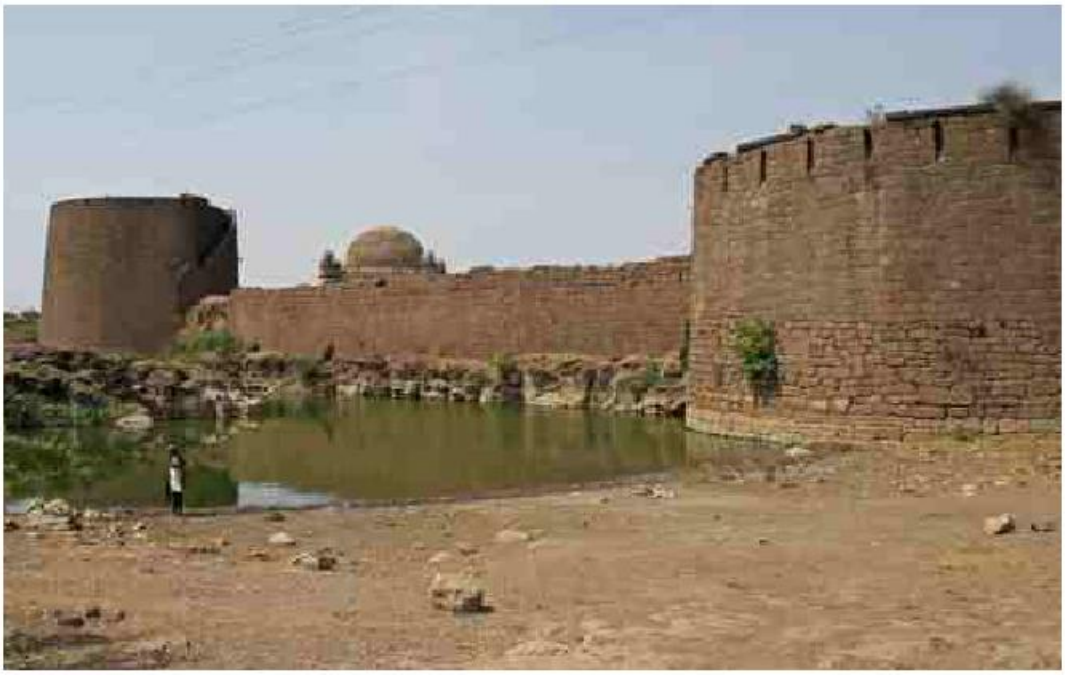
1. Onion (bulbous or concentric) domes
2. Overhanging eaves
3. Pointed arches, cusped arches, or scalloped arches
4. Vaulted roofs

5. Many miniature domes
6. Towers or minarets
7. Windows featuring intricate grills, and
8. Open pavilions

At Bijapur, for the development of the Indo-Saracenic style there are few reasons. First, the Adil Shahi Sultans had natural leaning towards the Hindu philosophy, religion, fine arts, architecture, etc. as they ruled the core areas of the Deccan, where the majority of the subjects were non-Muslims. Secondly, a close relationship existed between Bijapur and Vijayanagar for about seventy-five years; moreover, the Adil Shahi kings had a great liking for Hindu ways, and appointed Hindus to responsible posts. Thirdly, after the confederate victory of the Deccani Sultanates in the Battle of Talikot in 1565, Ali Adil Shah-I brought thousands of skilled Hindu craftsmen as the spoils of war, and in the future course of constructions they were deployed. Lastly, the architects and workmen were given full freedom to workout their own conception, and so the buildings were constructed nobly and decorated beautifully.

In the Muslim countries, it was in Egypt that the minaret received its highest development. But in India, it was in Bijapur that the minaret was first perfected in all its details. The slender and delicate minarets of the Ibrahim Rauza were shining against the blue sky when no such minaret decorated any building in India. In regard to the Indo-Saracenic architecture of Bijapur, Dr. B.D. Verma opines, "the capitals on the pillars possess the peculiarities; water-pots, torus, and lotus capsule of the Hindu capital. The rich cornices of the Ibrahim Rauza and the Mahtar Mahal are so obviously Hindu in design that they do not need any comment." In the arches also the Bijapur builders perfected a peculiar style which combined in it the grace of the Persian arch, the glory of the Gothic arch, and the Pipal-leaf-curves of the Hindu arch. In domes, Bijapur is unrivalled. The domes are bulbous and their bases are enclosed with strongly marked lotus petals. The dome of the Great Jami Mosque, even though it was constructed during the earlier years of the dynasty, is the most perfect of its kind. In the Golgumbad the architect carried out the idea of daring construction to its farthest limit and no country in the world can boast such a stupendous dome which covers the ground measuring 18, 225 Sq. ft.

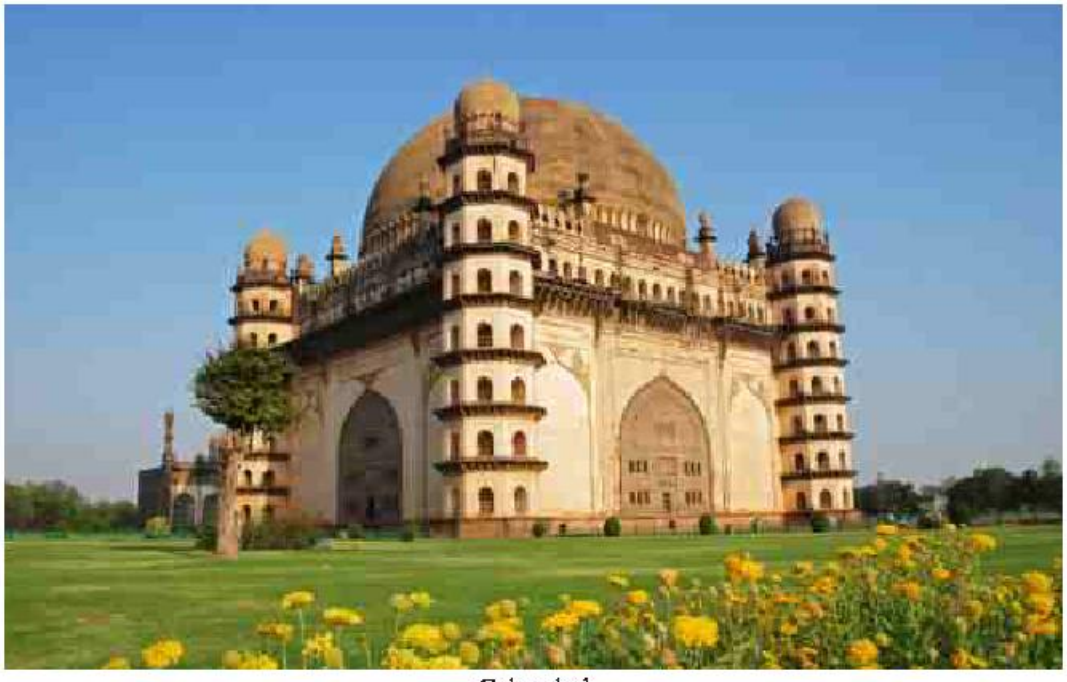
Thus, the Bijapur architecture owes its greatness to the united genius of the Hindus and the Muslims (Indo-Saracenic) and so it is a happy blend of strength and elegance. The builders and architects under the munificent and benevolent patronage of the Adil Shahis, perfected the domes, minarets, cornices, arches, etc. in fact everything which they touched. It may not be wrong if commented that the Indo-Saracenic architectural style reached its ultimate during the Adil Shahi period.



Bastions of Fort Wall

Great Jami Mosque

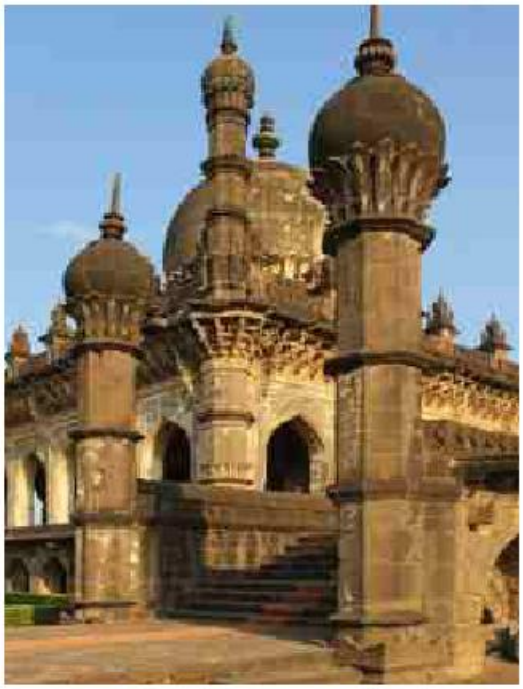
Gagan Mahal



Golgumbad

Asar Mahal

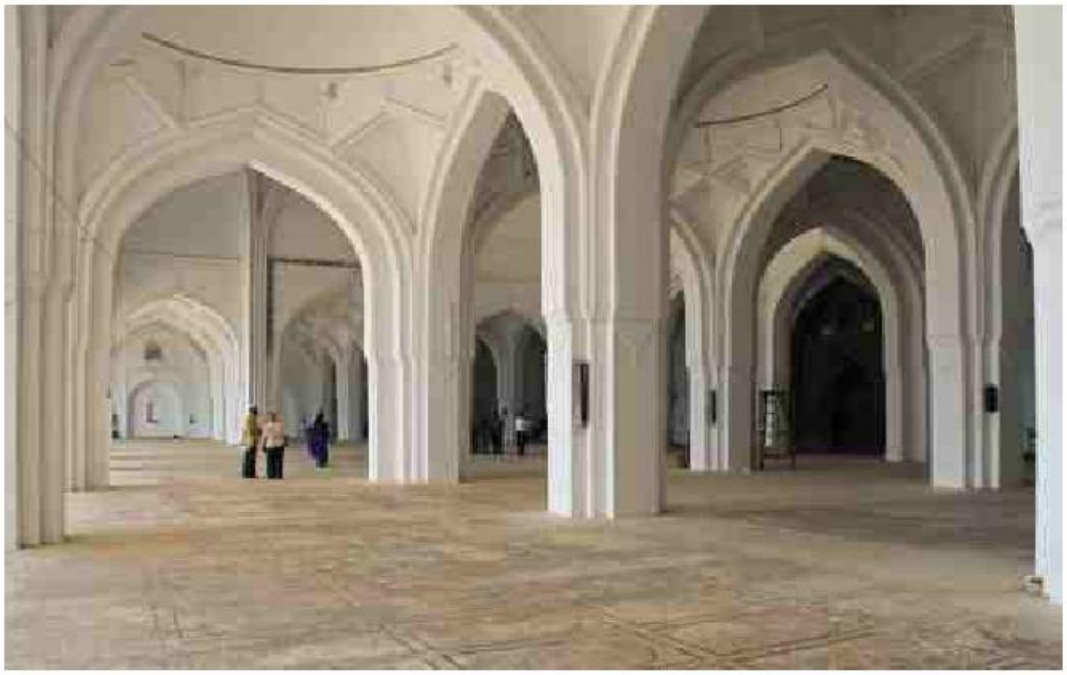
Madrasa



Ibrahim Rauza

Ibrahim Adil Shah's Mosque

Bulbous or Onion type Domes - Jod Gumbad; Shrine/Tomb

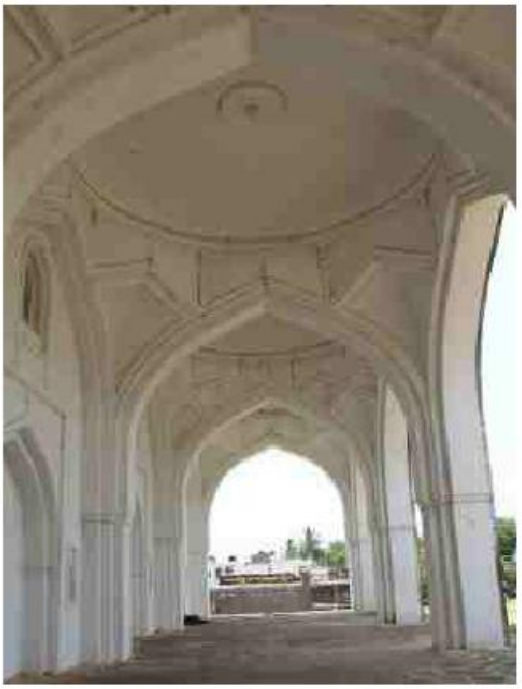


Praying Space in Mosque

Mihrab or Prayer Niche

Minaret

A blend of Indo-Islamic Architecture



Convent of Jami Mosque

Islamic Decoration

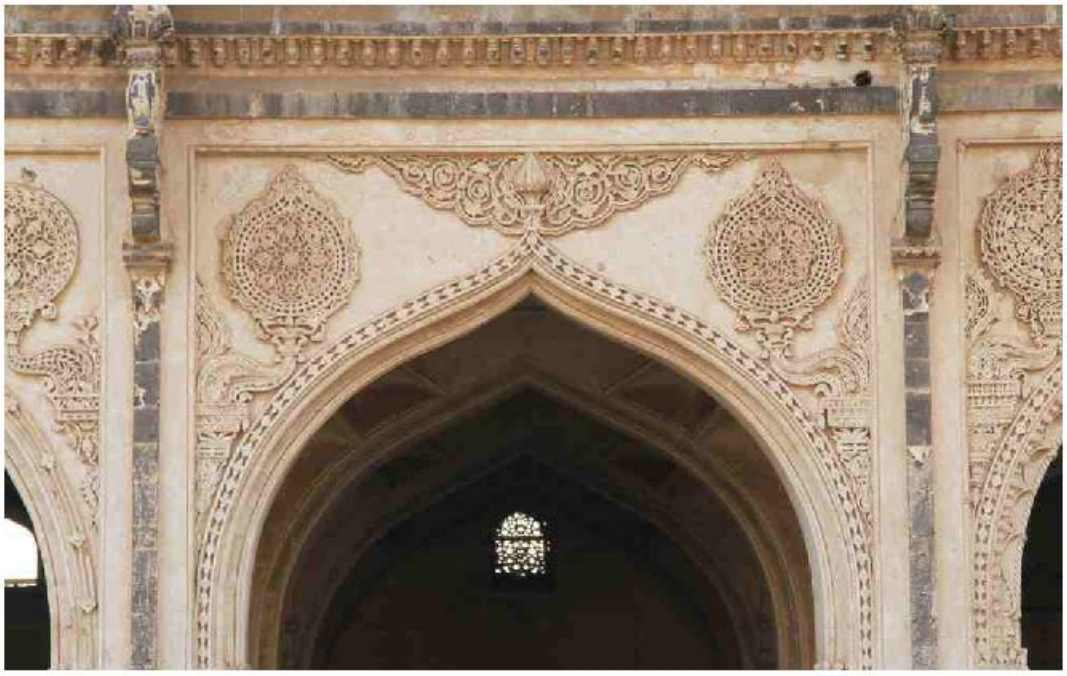
Designs in stone

Decorative Brackets

Islamic Calligraphy

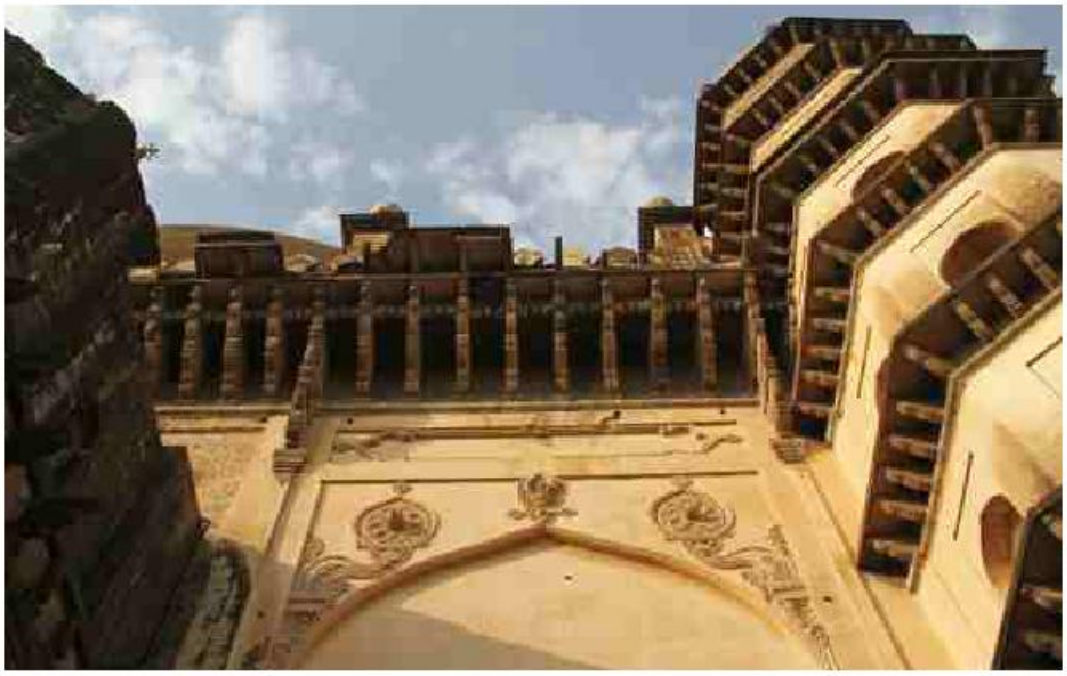
Sarai; Ibrahim Rauza Complex

Tank & Fountain



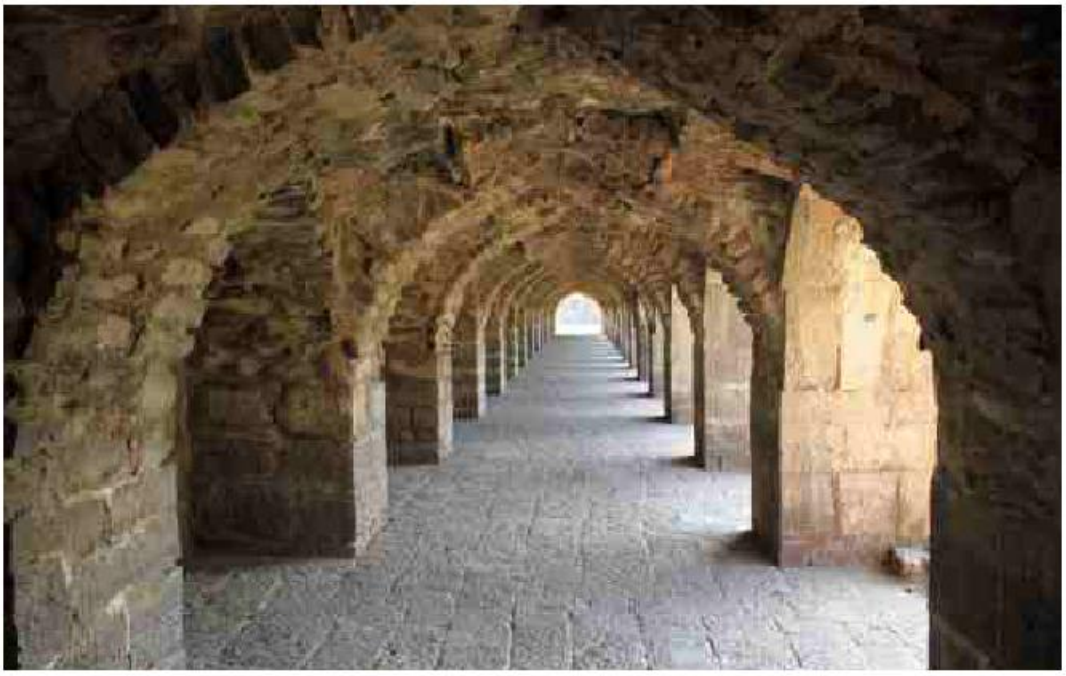
Stucco Decoration

Decorative Buds



Geometrical and arabesque design in stone and plaster

Minarets of Ibrahim Rauza



Vault Arches

Allahpur Gate with broken fortwall

Chapter-II

Water Works of Bijapur

In earliest times men settled in groups at places where adequate water supply was assured for their daily needs. As a result, the colonies, settlements and human habitations grew up by the sides of rivers and lakes. Later on when men learnt the device of digging wells for water supply, human settlements began to spring up at places where the subterranean water strata easily yields sufficient water through wells dug by human agency. The geological stratum under Bijapur suggests that the area was rich in springs and hence it attracted the settlements of communities. From ancient times itself the area was well known for habitation. The area remained as a centre for the political, religious and social activities of the erstwhile ancient dynasties of the south. It was because of its significance, the Adil Shahi Sultans made Bijapur town as a capital of their kingdom.

The Adil Shahi Sultans combined despotism with public welfare. Their water works, construction of *Sarais* (inns), gardens, shops, markets, store-houses, roads, charity houses, plantation of trees, civic amenities, maintenance of cleanliness in the town, etc. are worthy of note. In *Dasture-e-Amal* (Constitution) of the State, the above works are included in the duties of the Sultans. The Sultans were duty conscious, and they attended the administrative business from morning to late night. The contemporary sources cite that when Ibrahim Adil Shah-II fully consolidated his political authority, he devoted more and more time for his duties. Among the public utility works of the Bijapur kings the contribution of making elaborate arrangement of pure wholesome water for population residing within and without fort is prominent. They knew that the availability of water were the factors contributed towards the temperate climate, fertility of soil, ample production, development of trade and commerce, improvement of general economic conditions of the state, and habitations and township.

It has been commonly acknowledged that the early story of mankind owed its development to mainly geographical factors. Among these factors the availability of water is most significant. The plains of northern India situated at the foot of Himalayan Mountains are fed by big and small rivers all the year round. And it made

water supply, by and large no problem for the population resided in the Great Plains. In the South, however, the conditions were different. The rivers flowing from the Vindhyas and the Western Ghats were not perennial as in the North. The early settlements of mankind developed only along these river routes, but as the population grew and moved in the hinterlands, rocky terrain, hills and dales of the South, the water supply problems aroused. As the southern rivers not being perennial, there aroused the necessity of storage of water. In places where there were no streams and rivers, people had no option but to store the rain water. Thus, this practice was responsible for the construction of innumerable major and minor tanks in the south. In addition to the supply of drinking water, these tanks fed the agricultural fields. There are many epigraphs still survived from ancient south India that cite the construction of such tanks by the kings, queens, nobles, etc. of erstwhile dynasties of Pallavas of Kanchi,, Chalukyas of Badami, Cholas of Tanjore, Pandyas of Madurai, Kakatiyas of Warrangal, Yadvas of Devagiri, etc. Rajendra-I of the Cholas constructed a large irrigational tank called Cholagangam near his new capital Gangaikonda Cholapuram, in which he put water that was brought from the Ganges by his victorious commander. In addition, in the kingdom water was taken from the rivers as well. In those days the villages attached the greatest importance to irrigation works like construction, maintenance and repairs of tanks. Some epigraphs also mention gifts of sluices for tanks and of boats for removal of silt, etc. The tank committees of the village looked after the tanks attached through compulsory labour or donations, public charities or endowments. The terms like *Kodagi* (grant of rent-free lands in connection to water works), *Kudi Marammat* (voluntary repairs of tanks), *Nitadi* (an officer, who regulates water supply to individual fields were common in the Deccan.

The earlier history of Karnataka shows that at Badami, Bagalkot and Bijapur there were huge tanks existed that served both purposes of irrigation and drinking water supply. In Badami fort a reservoir built with steps had ample supplies of water through a conduit from a large cistern outside the town. The Bombay Gazetteer mentions that the water supply of the fort was, however scanty. The people of Badami town may not have suffered from scarcity of water as the dam constructed to the east of the town between the foot of the hills was their large reservoir.

In the medieval ages by following the examples of the ancient dynasties the Qutb Shahis of Golconda and the Adil Shahis of Bijapur constructed many irrigational tanks and water works that greatly benefitted their subjects. From ancient time in the Deccan it was taken that one who constructed a tank or made ample arrangement of water by other sources was assumed that he did a great religious activity, and the same belief ruled during the medieval time as well.

It is believed that in the Bijapur region before the establishment of the Adil Shahi dynasty the main water supply was from large number of springs. The people had to go to the source to fetch water which was obviously not a satisfactory arrangement. The scholars believed that the Adil Shahis were the first in the Deccan who executed the water supply works in the medieval ages. They were the precursors and authors of the remarkable schemes of water supply. By these works they left their names to posterity. We have references that on par with the kings, their nobles and elites took part in these works. They found the appropriate time and the pretexts to execute such great water works.

The first water tank seemed to be built in the reign of Yusuf Adil Shah, the founder. To commemorate his victory over one of his enemies he founded the suburb of Fatehpur, at about 5 miles in the east of Bijapur, where he constructed a tank that fulfilled the needs of the residents. The reigns of his successors Ismaeel Adil Shah, Mallu Adil Shah and Ibrahim Adil Shah remained scanty so far as water works are concerned. As a further matter, in the reign of Ali Adil Shah-I major water bodies were earmarked and that were properly utilized by use of scientific methods for the royal and public purposes. All around the fort new tanks had come up, among them mention may be made of Allahpur tank built across the stream of Aliabad, just within a reach of half a mile in the east of Allahpur Gate; the Rangrez and Qasim tanks, in the north-west of Bijapur fort-walls, the Torvi valley and Afzalpur tanks, in the west, two tanks in Kalabagh area in the south-west of Bijapur, the great masonry dam of Shahpur called Ramlingkhind, etc.

The Torvi valley, Afzalpur and Shahpur water works are to be considered as the great engineering achievements of Ali Adil Shah-I's reign. The Torvi valley and Afzalpur tanks supplied water within the fort and citadel through an underground canal of 8 x 6 feet and that carried water from the sources to the destination of three miles in length. The channel was built with burnt bricks and the water was flowed along a rocky-bed. To ensure steady flow of water, the channel had a number of vertical air shafts locally called *Usvas*. The shafts were made at the interval of about 40th yard. Till recently, it has been noted that water flowed into the city by this channel. The pseudo extensions of habitations wrecked the then testimony of great engineering skills. And even the trenches of Bijapur might have been filled as and when required from the stock of water. In regard to the stock of water in the reservoirs, the system of distribution and construction of underground channel a colonial writer, C. Schweitzer rightly pointed out that these water works were very credible engineering achievements of the Adil Shahis. While the Shahpur's Ramlingkhind tank served the water needs of the suburbs of Shahpur Khudawandpur, and Khwaspur, in the north-west of the capital. The water works of Ali Adil Shah-I's time can be attributed to the scientist of

Bijapur court named Shah Fatehullah Shirazi. Who lived in Bijapur for about three decades and joined the Mughal court under Akbar, the Great. His hydraulic know-how was greatly appreciated in the contemporary accounts of the Mughal period.

The succeeding Sultan, Ibrahim Adil Shah-II did not pay much attention for further extension and improvement of the existing water system except his arrangement of water supply to the palaces of Nauraspur, the newly founded parallel capital along with Bijapur. An arrangement of supply of water was made from a well that situated in slightly upper-land in the south-west direction of the palaces. A small conduit was constructed which facilitated supply of water. The Sultan remained contended with the existing water arrangements worked within and without fort. Seeing the ever growing population of the capital, Muhammad Adil Shah ordered his prime-minister Afzal Khan Muhammad Shah to execute a massive water supply project. In compliance, the premier built a tank in the south of Bijapur at much better level than the capital city. The tank was named after Hazrat Jahan Begum, a daughter of a pious person Shah Baniul Husaini, who remained a favourite queen of the Sultan till the end of his reign. The Sultan also constructed a beautiful palace in the east of Bijapur in the suburb of Ainpur. A big project of her tomb was also carried out, but due to untimely death of the Sultan, the structure remained unfinished.

The dam of Begum tank runs half a miles across the valley. The bed covers an area of 500 acres and because of its elevation it was able to supply water to almost all places in Bijapur city. The water was carried through the earthen pipes built in masonry, 15`` in diameter and to 50 feet below the surface. The pipeline runs in a full length of 2 ½ miles towards Shahganj, near Asar Mahal, and from there water was deposited in the distributor tank or reservoir of Asar Mahal. All along the course of pipeline 12 large square towers were built at a distance of about 800 feet to relieve the pressure of water and prevent the pipes from bursting. Water was made available from these towers to various localities, palaces, gardens, resorts, pavilions, wells, mosques, shrines, royal tombs, etc.

In regard to the water system network that starts from Jahan Begum tank is attributed to Afzal Khan. The epigraphs fixed on the water towers and distributors state the greatness of the builder. The English translation of the lines cite thus;

'If the exalted heavens were to display (for comparison)
The excellence (Fazl) of the excellent persons and the excellence of Afzal,
Instead of the Tasbih (the repetition of Allah's praise), every angel
Shall recite 'Afzal is excellent.'

In addition, during the rule of Muhammad Adil Shah, his nobles built two lakes or reservoirs called for distinction the big and the small at the villages called

Muhammadpur, corrupted to Mamadapur, in the south-west of Bijapur in about distance of 25 miles. They expended 50,000 *Huns* (gold coins) equivalent to Pound 21250. Both reservoirs are formed by earthen dams faced on the water sides by strong well built stone walls, damming two streams, at a place where a small gneissic and sandstone inliers had formed most favorable sites. The large reservoir was probably the largest existing reservoir of native construction in the then Bombay Presidency. When full its surface area was 864 acres or 1 ½ square miles. The dam is 2662 feet long, or just over half a mile, and its greatest height is 77 feet 9 inches. The escape for surplus water was cut in the hard quartzite rock. It had several outlets for irrigation each consisting of a series of round holes cut in stone at different levels closed by wooden plugs in the usual native method. These holes communicate with masonry culverts through the earthen dam. Except in season of unusual drought the water in this reservoir lasts throughout the year. The smaller lake to the east of the large lake when full has a surface area of 428 acres and a greatest depth of 12 feet. The length of the dam is 1180. This reservoir generally dries in March or April and as a result grains are sown in the bed. In regard to its construction, etc. two inscriptions were installed respectively on the dams of the lakes. Both denote similar meaning. One is still found on the big lake and the other of the small lake is preserved in the village mosque. The lines thus read;

'During the career of Khwas Khan, who was equal in rank to Asaph, whose family was spring from Solomon's minister, the building of this lake, generally known as Hauz-e-Sultan (Muhammad Adil Shah), was completed on the 1st of Muharram. Victory and fortune shall be in the stirrup of the King's horse as long as the sun reigns in the sky. May the just king Sultan Muhammad always be at the head of this prosperous country (Bijapur). This King of heroes ordered his minister Khwas Khan to perform such virtuous actions as find favor with the Almighty. Bearing this precept in mind Khwas Khan, the very fountain of benevolence, built this lake with a never failing supply of water. What an excellent lake? The sea even fails or is ashamed to equal it; nay, more than this, it excels the seven seas of the world in beauty. Its waves are bright and pure and its every bubble is like the moon. The fountain of immortality is as nothing compared to this lake and before it appears as dishonored as fermented liquor. This reservoir is Hauz-e-Kausar. A well in Paradise and its water is ever fare better than rosewater. The Prophet Khizar with divine inspiration uttered the words 'Hauz-e-Sultan is rare' which gives the year in which the dam is built. The cost was 50, 000 Huns, Hijri year 1043 (corresponding to AD. 1633)".

Apart from the contents of the epigraphs, certain story is associated with the construction of the lakes. That Muhammad Adil Shah wishing to know what the Konkan (on the western sea coast) was like, hearing this his prime noble named Jagad Murari (Pandit Murari Jagdev) built ponds, laid out fields, and planted Konkan trees and vegetables on the site. The act of the noble so pleased that in about 1633, the king

amalgamated the villages of Antapur, Barigi, Khasbagh and Chaudapur into one consolidated village and named it Muhammadpur, after his own name. In support of this story the historical evidences are absent, however, the builder of these lakes Khwas Khan and Pandit Murari Jagdev were close associates of each other.

Apart from the above, we have references that in the other parts of the kingdom such tanks were built and through them water was supplied for irrigation and drinking purposes. In this concern two inscriptions are found and studied by former Professor Mir Mahmood Husain of Mysore University, in the Chingri taluka of Shimoga district in Karnataka. The first one is bilingual, in Persian and Kannada languages, while the second is in Persian only. These inscriptions were fixed on the dam of the tank known as *Bade Sahab Ka Gunta.* On the former source the most of the Persian lines are in dilapidate conditions, however the rest is readable that runs thus;

Banaam-e-Jahandar Jaan Afrin
Hakim-e-Sukhan Dar Jabaan Afrin

(In the name of the Owner of the world, the Almighty Creator; who created the souls; He is the Master, who made the tongue to speak)

This is the exordium of the ode from the poetry of Shaikh Saadi, the great philosopher and poet of the medieval ages. The second line is read as;

Az Barkat Muhammad Mustafa Saule Allah Alaih Wa Sallam
(From the auspiciousness of [Prophet] Muhammad Mustafa, peace be upon Him)

Dar Abad Sultan Muhammad Shah…
(During the reign of Sultan Muhammad Shah)

Ibrahim Khan-e-Khanan Naam Ast Farkhanda Hauz
(Ibrahim Khan-e-Khanan is the name, the Fortunate Tank…)

Khub Sihat Shudan Hauz Khwam Bast…
(May he [the Sultan] get a sound health, the Tank will intend)

The other parts of Persian lines are missing from the tablet. However, the lines in Kannada language are intact and evidently readable. The translation of the content states that;

"Aamil Bada (Baree) Malik son of Laar Khan made mind for the construction of this tank. At the time of its foundation it had come to the knowledge that the Sultan had fell ill, hence he vowed and made oblation that if the Sultan would recover his health (God willing) he would complete the construction. The work is pious and full of benediction; this is learned from the Religious Scriptures of the Hindus. Earlier at this place, situated in the south of Basavapattan there was thick forest, where the

dacoits and looters dominated. When the travelers complaint, he (the above officer) personally appeared at this place, cleared off the forest, habited a village called Walipur (presently known Milipur) and constructed a Gunta (tank). For agriculture purposes free land was given and arrangement of welfare and development was made. He made the declaration that he would make arrangement of plenty of agriculture, supply the sugarcane juice to the on-going travelers and build the housetop sheds. Continually plant the coconut trees and ensure the agriculture production of rice and areca-nut, so that the people become happy. Congratulations for Hindus and Muslims." In this inscription the *Devmala* of Hindus is written with the names of the officers in charge. The year of the foundation or the construction is absent in both the languages. The contemporary accounts record that the Sultan fell seriously ill in 1646. The news of illness spread in his kingdom and as a result Baree Malik made vow to Almighty God and offered oblation in shape of tank for restoration of health of his overlord. Seeing this we may ascribe the foundation and beginning of the construction activity of the tank to 1646. Though the tank is named after Baree Malik, but it is popularly called as Bade Saheb's tank.

In other inscription the name of Sultan Muhammad Adil Shah is mentioned with the year of the completion of the tank i. e. AH. 1064 (AD. 1652). By this time the Sultan became all-right and resumed the state business. The inscription states the fulfillment of builder's oblation and pious intention.

In taluka Shikaripur of the same district another tank by name Masurmadag was found. Probably it had been constructed by the local chiefs of Keladi and Mysore region. In 1863 the then British authorities undertook the restoration work of the tank. In other towns of the kingdom like Honwad, Almel, Afzalpur (a taluka headquarters of district of Gulbarga) and other places the ruins of such tanks built either by the ancient rulers or the Adil Shahis can be found.

In Bijapur the water system of the palaces was also superbly arranged. The tanks of palaces of Farrukh, Mustafa Khan, Chini, Shah Nawaz Khan, Khwas Khan, etc. constructed in and around Bijapur were filled from the wells close by. The water being drawn by a mot, that managed by generally oxen power, into an elevated cisterns, which ran into the tank of the palace through earthen pipes. The same engineering work we see in the water pavilions of Kumatagi, however, the improved system of Persian wheels invented by Shah Fatehullah Shirazi might have been installed. The cisterns of Sat Manzil, the pavilions of Mubarak Khan and Kumatagi served to the Adil Shahis as the holiday resorts. In regard to water lifting device in medieval Bijapur Klaus Rotzer opines, "The water lifting device consisted generally of a pulley fixed at the top of a masonry buttress overlooking the well. Behind the buttress, a slope, made of earth extended the construction and enabled a draught animal to move along. The

water was lifted in a bag fixed to a rope pulled by the draught animal. This process seems to have been the only one in use till the middle of the 16th century. Later in Bidar and Bijapur, another device, generally termed the "Persian Wheel", was introduced and applied at some water bodies. In this case the water was lifted in small earthen or metal buckets fixed on a kind of girdle moved by a wheel. Instead of going up and down a slope, the draught animal here moved around an axis on a platform. A third device was also invented during the 17th century at Bijapur. We here term it the "Kumatagi device" because the best preserved examples are found at Kumatagi near Bijapur. We do not know exactly how it functioned. What is left of the structure shows a high wall built on one side of a well or reservoir; on top of the wall there are corbels to fix the lifting mechanism and small tanks; earthen pipes set in lime mortar linked the tanks to fountains. How the water lifting device was set in motion cannot be established. For certain, this device was invented to bring water under high pressure to fountains."

To supplement the water needs of the people in and around the city the Sultans and the nobles constructed wells like Taj Baudi, Chanda Baudi, Badi Baudi, Bibi Bandi ki Baudi, Gumat Baudi, Chini Mahal-II Baudi, Mustafa Khan Baudi, Ilal Baudi, Mal Baudi, Mubarak Khan Baudi, Nagar Baudi, Ikhlas Khan mosque Baudi, Maa Sahab Baudi, Nim Baudi, Rafia Baudi, Khwas Khan palace Baudi and Padshah Baudi. There are many other wells, which have probably missed the sight of Henry Cousen. They are Panch Chawri Baudi, Pahad Khan mosque Baudi, Allahpur mosque Baudi, Golgumbad tank and a small well in the east, Jod Gumbad Baudi, Naginah Bagh Baudi, Basri Baudi, and another well in the south of it, Bara Kaman Baudi, Ibrahimpur Baudi, Hashim Pir Baudi, Daulat Kothi Baudi, Pir Khan Baudi, Zain Sahab's Baudi, another small well in the west, a well in the north of Nagar Baudi, a well in front of Shaikh Ainuddin Ganjul-Ilm's tomb, Aghapur Baudi, Rauza Baudi, Gang Baudi, another well in its west, Afzal Khan's wives Baudi, Chapparband Baudi etc. Some of the wells are roofed and the water is found in underground. The examples are Pasha Boudi (infront of Darga of Shah Karimullah Qadri) and the Chhat Boudi (in the north of Naugumbad Mosque). As in the city there are many such wells existed around Bijapur in the places like Torvi, Tikota, Khadijahpur, Utnal, old suburbs etc. Any army investing the city could easily be cut off outer water supply from Torvi or Begum Tank, but the wells within the walls would supply water to the besieged. Captain Sykes reports that there were within the fort-walls 700 wells with steps (Baudis) and 300 without steps (Kunhas or small wells). In other regions of the kingdom such wells were also excavated. The town of Bagalkot, it is said, had ample supplies of water from a large well. Similar wells were found at Almel (40 miles in the east of Bijapur), besides a large pond to the west of the town also supplied water.

There are instances that in the capital and also in the kingdom the charitable wells had been dug. The inscriptions of the Gumat Baudi, Mal Baudi, etc. record the endowment of the wells for the charity purposes in the name of Almighty God. Another inscription dated 1604 tells us the completion of a charitable well at Bilgi (presently a taluka headquarters in the district of Bagalkot) by Khanderao, an Adil Shahi officer.

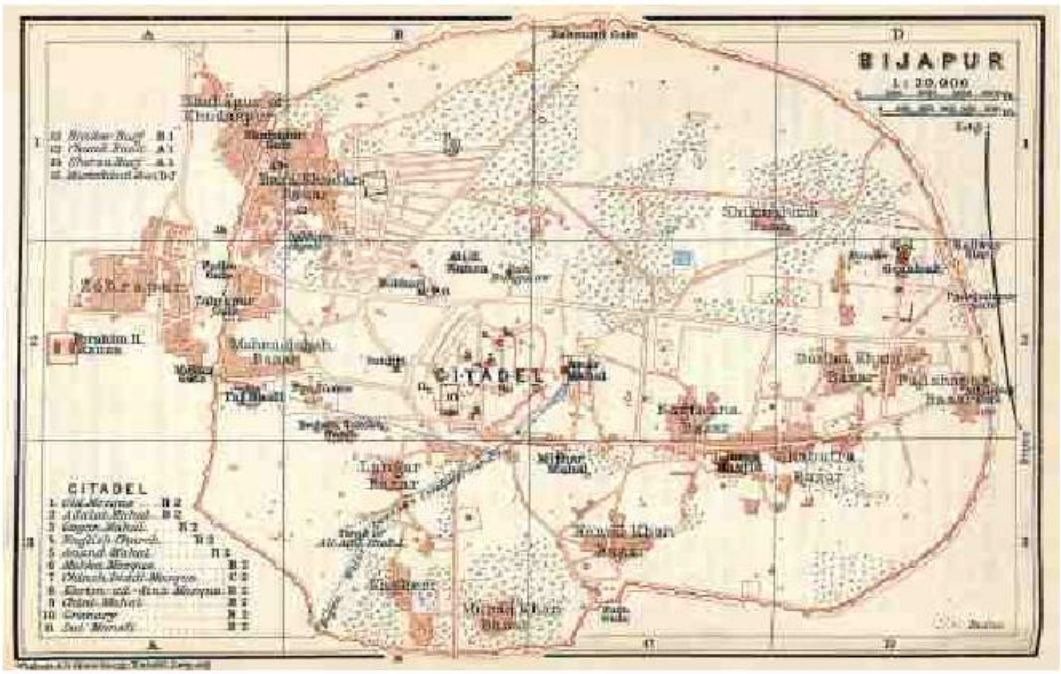
Other than the planned and systematic water sources in and around the city, the pits of the mines from where the state extracted the black basalt stored the rain water for the year. That helped a lot to maintain the water level of the bodies up. Further the construction of tanks in all the directions of the capital ever supplied water to the wells of Bijapur through the natural process. The presence of all supra water bodies made the environ temper and cool. There the growth of forest was also witnessed in those days. We have instances that the Ibrahim Adil Shah-II and other kings and the elite went in the nearby forest for hunting. Till the beginning of the 20th century the deer, the wild pigs, etc. took stroll on the brinks of the trenches of the fort.

The forest and the greenery of the surroundings of Bijapur had been destroyed deliberately by the Bijapur army. As and when the invading armies of the enemies besieged the fort the Bijapuri generals adopted the defensive tactics and scorched earth policy. All around Bijapur for 40 to 50 *Kos* (150-200 Kilometres) no trace of grass or fodder was left. The tanks of Torvi, Afzalpur, Allahpur and Shahpur had been drained dry. All the wells in the environs were either filled with earth or thrown into it the poisonous elements. Further, the invading armies cut water supplies of the tanks to compel the submission of the besieged. And by the passage of time as the state of neglect rule the natural and artificial water bodies of Bijapur were subjected to ruin.

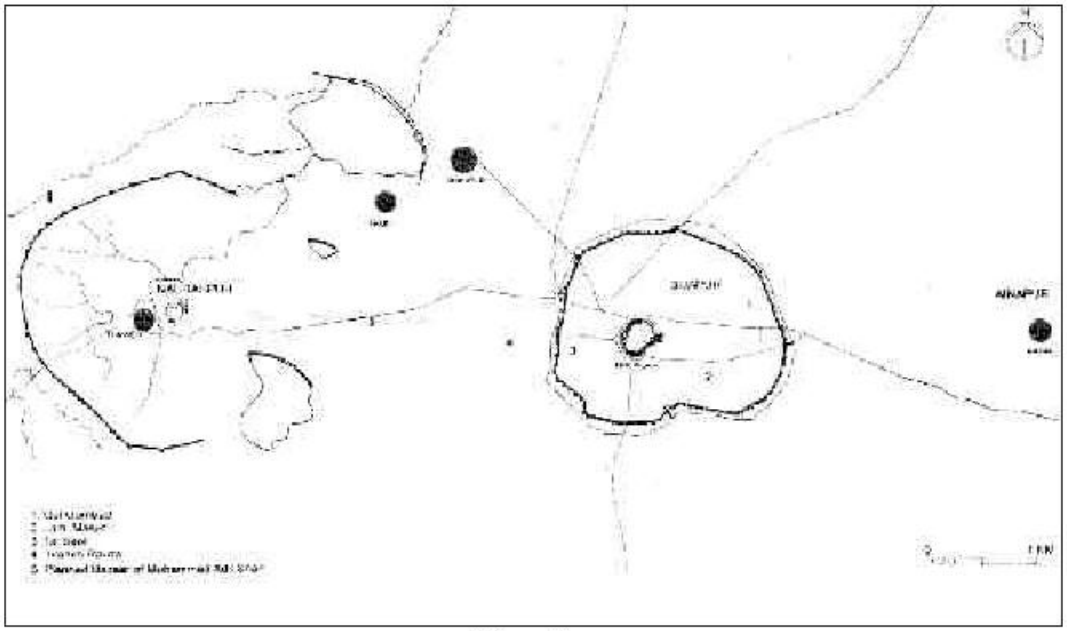
Thus the Adil Shahis applied their scientific knowledge and converted Bijapur, a dry place known for scarcity of water, into a verdant, flourishing and prosperous region by making the presence of water. It is matter of great surprise to note that the Adil Shahis opted Bijapur a town that was not much known for its water resources. By selecting Bijapur as their capital they reversed the ongoing ancient and contemporary trend of founding the capitals on the banks of rivers or near to the natural water bodies like ponds and reservoirs. In this regard few examples of the capitals cities which figured on the banks may be mentioned here; Allahabad (Prayog), Badami (Vatapi), Malkhed, Vijayanagar Hampi, Bahmani's Firozabad, Golconda/Hydrabad, Delhi, Agra etc., Bijapur's selection was a sort of challenge to the Adil Shahis that they overcame. Seeing the contribution of the Adil Shahi kings in this field S.K. Sinha observes, "For the first time in the history of India such elaborate arrangement for water supply was made…so scientifically designed and meticulously executed".

Agastya Tirhta - Badami

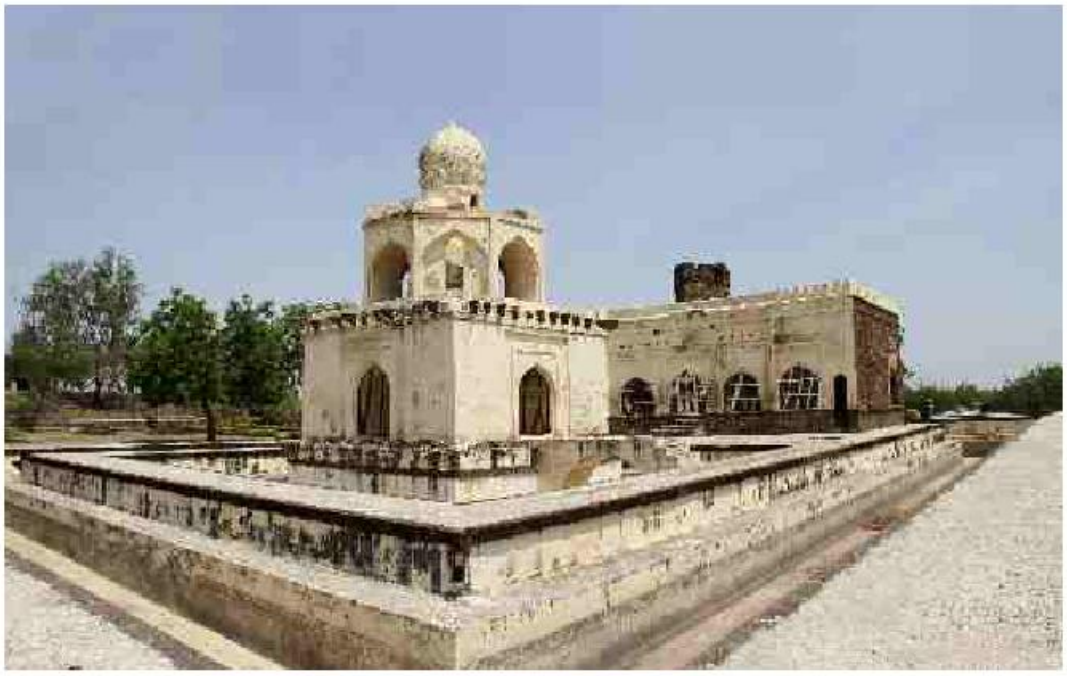
Renovated Jahan Begum Tank



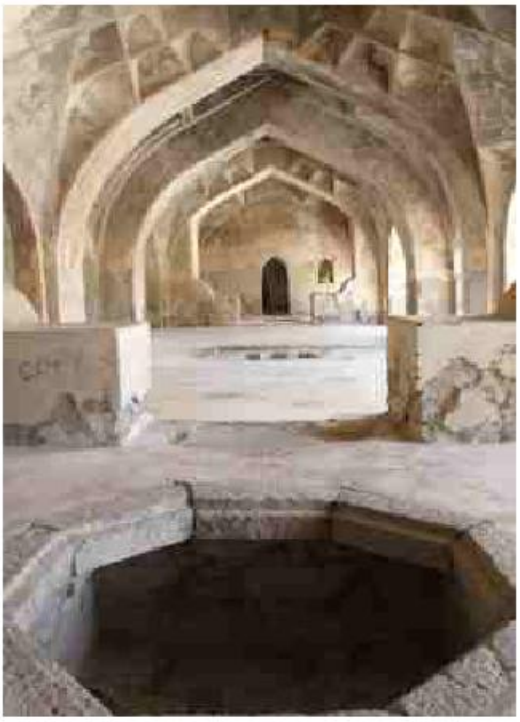
Bijapur Map



Bijapur Map



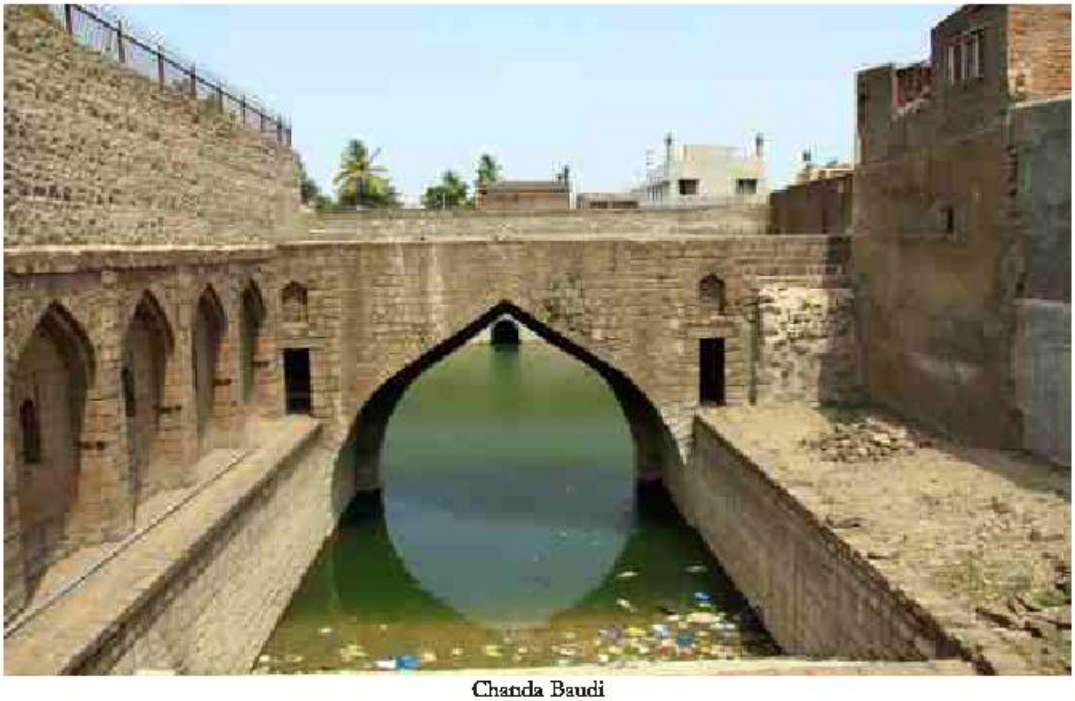
Water Pavilions - Kumatagi



Royal Bathing tubs - Kumatagi

Open air bathing tub on the roof and over head tank tower - Kumatagi

Water bodies, in the north of Golgumbad



Chanda Baudi

An arch that held the persian wheel

Maa-Sahab Baudi

Chapter-III

Taj Baudi and Its Utility

The Adil Shahi Sultans of Bijapur whatever they planned and did that were absolutely intended in public interest and welfare. The edifices and places like the public buildings, gardens, tanks, markets, mosques, inns, distribution of water to the passersby, wells, resorts, water pavilions, mosques, reservoirs, etc. had cropped up in public cause. Even the royal pleasure also provided utility to the public. As the kings fully understood, for example, that the water was the soul and life of the establishments of palaces and gardens, hence they constructed the tanks and wells that supplied water to the trenches, palaces, mosques, tombs and gardens, in turn; these resources of water fulfilled the needs of the people. Further, when the royal parties resorted to hunting or to the water pavilions of Kumatagi and other places in the kingdom, the towns and markets were perhaps crowded with buyers and sellers in precious metals, diamonds and other rare materials. Due to the presence of the royal members the towns turned into great centres of business, thus the above instances obviously showed that even the amusements of the rulers or the elite benefitted the people of the areas. The irrigational tanks and reservoirs amply facilitated agriculture. In consequence the fruits, vegetables and other garden crops were produced in abundance, and trade and commerce flourished.

The study of the Bijapur Manuscript Map preserved in the Archaeological Survey of India Museum, Bijapur and our physical survey of the five principal gates viz. the Makkah Gate or Arab Gate, Shahpur Gate, Bahmanhalli Gate, Allahpur Gate, Ittanhalli or Hitannalli (later the victorious Mughals renamed it to Fateh Gate, as Emperor Aurangzeb was able to humble the Bijapuris from the southern side, and further through this Gate he entered in to Bijapur) Gate of the fort suggest that the Sultans had civic consciousness. They provided all sorts of facilities to the travelers and permanent dwellers of the capital. It is found that inside the fort, in an area adjacent to every principal gate a well furnished mosque is constructed which provided all sort of basic amenities to the visitors. After meeting out their needs at the mosque they could move to the markets for buying and selling of the goods, etc. So much so that in the capital the public latrines were also found. At the campus of some of the wells like Taj

Baudi, Chanda Baudi, Badi Baudi (in the south of the Great Jami Mosque) the public bathing system was existed. It is likely that the major well were meant for the bathing, washing of clothes and irrigational needs, whereas the small well locally called *Kunwahs* were intended for drinking water purposes.

History records that the tanks and wells of medieval times served the population of Bijapur even after the end of the Adil Shahi rule. Modern researches proved Bijapur continued to enjoy its status, and its monuments and the public utility edifices were intact till the year 1760. The ascendency of the Peshwas in Bijapur reduced the importance of Bijapur in all respects. Their pre-occupancy in the north Indian affairs left Bijapur unattended. During the regime of the Rajas of Satara the town and the people got the sigh of relief. When the British took over the reign some preservation, conservation and restoration works began. Seeing the demands of the growing population of the town for fulfillment of the basic needs like water supply, etc. the government began to think the restoration of some of the water works of Adil Shahi period. By this time due to centuries of stagnation the water supply arrangement fell into disuse and woefully deteriorated. The Torvi and Jahan Begum tanks' water works no longer supplied water. Except for a few wells in the inhabited localities, all other well and tanks, big and small had fallen into disuse. The sides of the wells had crumbled into the water making it unfit for domestic consumptions. But even so the water that was available in the wells then in use met the needs of the population for many decades. The Town Municipality of Bijapur then managed 19 wells and served the public by making such repairs as were necessary to keep the water sources in good condition. It was observed in the then reports that in Bijapur the water supply was abundant and good and that nothing was required except that existing wells had to be kept in order. When it was learnt that there was water scarcity in the locality of Jami Masjid area, the authorities by expending Rs. 6000=00 restored the water connections by getting the conduit from Jahan Begum tank to Asar Mahal cleaned. Moreover, in 1904 at the cost of Rs. 4540=00 the works of improving Thal Baudi viz. cleaning of silt, construction of side walls, etc. were undertaken.

Though the water works of Adil Shahi period got the credit to fulfill the water needs of the people of the town till recently, however, the problem of adequate water supply could not be satisfactorily solved. Emphasizing the need of maintaining the sources of water supply in god hygienic state, the Sanitary Commissioner to the Government of Bombay Presidency in his annual report for 1893 observed, "the restoration of the Torvi aqueduct which was constructed on the Persian principle similar to the underground channels in use at Ahmadnagar is worthy of serious consideration. The important work might be carried out piecemeal as funds became available..." Though the people of Bijapur developed a passion for restoration of old

Adil Shahi water works, however, amidst the peaceful opposition of some of eminent citizens of Bijapur the construction of the Bhutnal tank had come up in 1914 at the cost of Rs. 681956=00. The opponents rather pleaded that the restoration of the old sources suffice the requirements of water, the government by spending lakhs of rupees might instead resort to conserve the old tanks and wells in minimum expenditure. That they feared the construction of the above tank may ruin the old sources. In accordance with the apprehension of them, it happened. Moreover, the perpetual visits of famines and droughts in the last decade of 19th century and first decade of 20th century dried up almost wells of Bijapur. The great engineering wizard, Sir M. Visweshwarayya by taking instances from above water scarcity situation convinced the Municipal Authorities and the public of Bijapur that the old ideas were to be given up and a new project be thought of and undertaken. He insisted to go for new technology and a permanent solution of water problem. He discarded all the ideas then prevailing, of resuscitating the old water works. Such suggestions were also frequently made by Bombay Presidency's Inspecting Officers. In consequence the Bhutnal tank was constructed on lower surfaces of the north-western *Nallas* (streams) that earlier remained as a main source of catchment of the then Ramlingkhind tank of Adil Shahi period. The Bhutnal tank supplied wholesome water to the people of Bijapur for about 80 year till the alternate arrangement was made probably in the last quarter of the yester century to lift water from the Krishna River. Though the benefits of water supply from the Bhutnal tank were great but its presence made the authorities and the people to discard the erstwhile water bodies of the medieval period.

In regard to Taj Baudi and Chanda Baudi it had been noted that in the time of famines and droughts these water bodies ever relieved the people of Bijapur from all water problems. Sometime the latter dried up, but the former it was never. In the first decade of 20th century when almost wells dried up the people of Bijapur had to trek long distances to fetch water from Taj Baudi. With view to make additional arrangement of water supply in the 90's of last century the District Authorities tried to de-silt Taj Baudi by removing water. After a fortnight's exertion the results were found futile as the live water sources filled the emptied water in no time.

Historically the Taj Baudi is counted among the great monuments of Bijapur that is why it strikes every visitor. It had come up in the year 1620 in the name of Taj Sultan (d. 1044 AH. corresponding to 1634-35 AD.), the favourite queen of Ibrahim Adil Shah-II. Further, the Sultan also executed an ornate project of Ibrahim Rauza, originally named Taj Rauza in her name. As such he constructed a beautiful mosque called Malikah-e-Jahan (a senior queen, who was a sister of Quli Qutb Shah of Golconda, also called Chand Sultana) in the west of the citadel walls. In regard to her beauty he praises in these words in his *Kitab-e-Nauras;*

"The Creator took the best light from the moon causing a spot in its face (which is nothing but a pit which should reasonably be dark and dreary). Thereafter he painted a form which put all the Hoors (beautiful heavenly ladies) and fairies to shame so as to cause them to hide themselves in heavens and in infernal regions (respectively). Ibrahim (the Sultan) has seen all the beautiful ones; but none would compare with Chand Sultana, known as Malikah-e-Jahan." (the translation is after Dr. Nazir Ahmad).

The Sultan had another two queens namely Kamal Khatun and Sundar Mahal (a daughter of Antu Pandit). We have no traces that the Sultan had also constructed buildings in their names, as supra.

Taj Sultana was probably a princess of Ahmadnagar, and by good offices of Chand Sultana popularly known as Chand Bibi, the dowager queen and aunt of Ibrahim Adil Shah-II, she was betrothed with the Sultan. The succeeding king Muhammad Adil Shah was her son. As in the case of Malikah-e-Jahan Chand Sultana, the Sultan engraved few poetical couplets in Persian in praise of Taj Sultana on the door frames of Ibrahim Rauza. The partial translation reads thus;

"(Taj Sultana) Dignified like Zubaida and exalted like Bilqis, the throne and crown of modesty are beautiful because of her…Taj Sultana ordered the construction of a garden tomb (Rauza) and Paradise remained astonished at its beauty. She set aside for its expenses one and a half lakhs of Hun (gold coins), but another 900 were added to that sum (i. e. 150900). This work of building the Rauza was brought to completion by Malik Sandal, by virtue of efficient supervision." (translation after Bruce Wennel)

In the above translation of Persian poetry the virtues of Taj Sultana are cited. She enjoyed dignity in Bijapur like Zubaida (AD. 786-831), the Abbasid queen married to Harun-Al-Rashid, the firth emperor of the dynasty. In history she is particularly remembered for the construction of the series wells, reservoirs and artificial pools that provided water to the Muslim pilgrims along the route from Baghdad to Makkah and Madinah, which was renamed *Darb Zubaida* (a road of Zubaida) in her honour. The reason for undertaking such a massive project was that during one of her pilgrimages she noticed that there was a water problem and many pilgrims could not afford drinking water in areas of Makkah, near Mount Arafat, Mina and Muzdalfa. She was so distressed by seeing this that she brought forth the best engineers to build a canal that provided free water throughout all area of Makkah. The water was brought from over the mountains for many miles and from the ground using tunnels, pits, channels and all other methods. She was found intensively involved in the whole process as if she was educated in the ways of building and planning cities and infrastructure. Further, Taj Sultana was compared with a virgin queen Bilqis of Sheba in Yemen. The religious

texts of Hebrews, the Christians and the Muslims praise her beauty, power and wealth. Seeing her virtues Prophet Solomon married her.

The queen of Bijapur, Taj Sultana was known for her magnanimity and cultural contributions. She enjoyed great respect and admiration from the people. Her association with Malik Sandal, the great architect of medieval times brought the construction of Ibrahim Rauza, its gardens and Taj Baudi. It is evident from Persian text of an epigraph fixed under the western side of façade arch of the well that the intention of construction of Taj Baudi was pious as in the case of works of queen Zubaida. Earlier the epigraph was placed in the Archeological Survey of India's Golgumbad Museum when Dr. M. Nazim had studied it for his work 'Bijapur Inscriptions'. In the later years it was shifted to Taj Baudi and fixed at an appropriate place meant for it. The text and its translation read thus;

'Bandah Haqeer Malik Sandal az Maal Khud Imarat Taj Baudi Baraye Ibadat Fuqara wa Hamam Baraye Ghusl wa Istarahat Khalqul Allah Banakardah Fisabillih Waqf Harkeh Matsaraf Shud Ya dar aan Khulali Numayed Bar Khar zan wa Maadar auw Sawar Bashid wa Ba Laanat Abadi Garaftar Asyed"

(The humble slave Malik Sandal constructed at his own expense the building of Taj Baudi for the service of religious mendicants and the *Hamam* for bath and as a resting place for the people of Allah, and bequeathed it to the service of Allah. Whoever seeks possession of it or damages it may his wife and mother ride a donkey and may be overtaken by an eternal curse)

Thus the structure was intended to provide services to the Godly men or the religious personalities like the Sufis, the mendicants, etc. Before they could get audience at the royal court or attendance before the king or for them proper arrangement of house, livelihood or grants of landed property were made by the state they temporarily stayed along with their followers and groups in the eastern and western apartments at the Taj Baudi as royal guests. It was same case with the nobles, learned men, scientists, etc. who migrated from the Middle-East and made Bijapur their surrogated motherland. The construction style of the apartments suggests that they were beautiful places floored with costly colourful Persian carpets and barred with beautifully designed curtains. The places were very airy, well ventilated and they received ample light. The widows that opened inner side of the well provide very pleasant scenery of the entire well. The adjacent arches may be called *Sarai* meant for the travelers and other persons of eminence. As of the western, the eastern apartments, presently some portions are missing, built with the similar intentions. In this section in one room the hot water was prepared, where a big bowl was fixed and under it an arrangement of fire was made. It seemed the bowl was fixed with a tap that run up to the bath rooms

built in the southern side of the well. Where, in addition, one small tank and the latrine arrangements can be seen. It seems such facilities were extended to the religious and elite persons; the others might take bath from the normal water or swim in the well. Thus this utility makes the well the great swimming pool, where the people would have re creational facilities as well.

The Taj Baudi also provides facility of stable for animals. This arrangement was found in the back of the western apartment of the structure. The tank for animals which received water through the pipes connected with the tank found in the middle of the western wall that was filled by dragging water through the conventional method locally called the *Mot* system. Such *Mots* are also found in the opposite eastern wall and two other on both sides of central structure of the southern side. These *Mots* might have been well connected with the chateaux of the well, from where the occupants might entertain by enjoying the splashing sound of the water dragged up, and the beauty of the well. It does not mean that the well was meant only for the newcomers; on par with them the citizens of the capital might also take use of the water from any direction of the well. It is noticed in the Bijapur Manuscript Map that in the water of Taj Baudi fish flourished, while in the water of Chanda Baudi fish did not exist. It means the water of the well under study was pure and wholesome that suited to all sorts of needs of men and animals.

It is interesting to note that in the front of the eastern wing the holes are made in the stone of the wall made equal to waist-height. The holes intended to hold the water filled earthen pots. In the front, just beneath wall a platform is built. The passersby of the principal road could sit on the platform and saturate their thirst from the cold water supplied by the state officials.

It is likely that the water of the well was supplied to the nearby palaces of the nobles and the convents of the Sufis. As such, near to the well were the palace of Khan Muhammad Khwas Khan and the *Khanqa* (hospice) of his mentor Shah Abdur Razzaq Qadri. The archaeological remains evidently suggest that the great nine gardens that situated in the south and south-east of the well received water from the southern water channels of the well. Thus the two sides, viz. east and west of the well had healthy environs as there existed the royal gardens. Here there might exist countless fountains embowered in trees played in every quarter and fragrant flowers filled the air with their blossom and perfume.

Further, the utility of Taj Baudi can be valued equally to the Great Bath of Mohenjo-Daro of the Indus Valley Civilisation that flourished from 3600 B. C. to 1800 B. C. The Great Bath contained a water pool in the middle, bathrooms, dress changing rooms, even the stairs within surrounding rooms from where one could climb on the

roof. In regard its use Dr. Wheeler writes, "the whole structure suggests that it was having provided to the members of some kind of priesthood who lived in the rooms above and descended at stated hours to perform the prescribed washings whereas the general public took their bath in the Great Bath itself". In this same way the utility of the Taj Baudi connotes the same meaning and definition as of the Great Bath. It is evident from the Persian epigraph it was built for the services of the Sufis, mendicants, deserving persons and the general public, and it was dedicated and bequeathed to the service of Almighty God. Besides, a curse is written for a person who seeks its (illegal) possession or damages it or makes use of it other than the prescribed in the epigraph. Thus in the light of the contents of the epigraph it is fair supposition that the whole complex related to the religious life of the city and its rulers.

The structure of Taj Baudi is square in plan 223 feet each way, and is enclosed within high walls on the east, south and west, and a range of apartments along its north side. The entrance is through the middle of this, by a broad flight of steps over which is thrown a lofty arch, 35 feet in span, flanked by octagonal towers (minarets). Descending the broad flight of steps between the towers, and passing under the great arch one comes upon a broad terrace or landing which juts out into the water of the well, from which flights of steps on both sides lead down to the edge of water. Around the inner side of the high wall that encloses it, runs a narrow gallery or terrace, with a low parapet wall on the inner side. This communicates with sets of rooms (chateaux) in the middle of each of the three sides which overlook the well.

The Taj Baudi is magnanimous in the style of Islamic architecture – fusion of Islamic and the Persian work, with wide open dome, a band of conventional petals, use of pendentives and richly carved *Chajjas* and graceful minarets are some of the salient features of the style. The fantastic surface decorations comprising of floral ornamentations and intricate cut plaster works add charm. The roofing of the eastern and western apartments of Taj Baudi and Ibrahim Rauza bears some similarities in construction, designs and technology. In both cases the roofs are really self-supported and stood by lateral arrangement, they are held in their places simply by the adhesiveness of the mortar used. Both the edifices are contemporary, in later years the same roofing technology was used for the vault roof of Golgumbad.

The topography of the well was very cautiously selected as in the case of Ibrahim Rauza. The structure stands on the principal road that begins from the *Arkqilla* (the citadel wall) and passes from the front side of the Ibrahim Rauza complex and reached to once a parallel capital of Nauraspur. The survey of the western side leads to arrive on the conclusion that the traffic from the western sea ports should enter the suburbs of Shahpur by passing through Tikota town and the villages of

Malkandevarhatti, Siddapur, Dhandargi, Itangihall, etc. To halt illegal entrance a long barrier was erected that ran to the south and further east, from the brink of Shahpur suburbs. Probably at Shahpur the toll-houses were situated. It looked that the Shahpur Gate was earmarked for the entry of the natives of Bijapur, and the newcomers got entry through the Makkah Gate, where the office of the immigration check was existed. After observation of the mandatory vigil the newcomers were allowed to occupy the royal Apartments. Here too concerning the details of the occupants the register was maintained at the offices housed in the two minarets stood on both sides of the façade arch. The space within the arches, the secured wooden window panels, strong iron bosses of the panels, etc. evidently lead that the place was meant for the establishment offices, from where the whole structure of Taj Baudi was managed.

Many divergent opinions are current in regard to its builder. The most accepted fact is that Malik Sandal, also called Haji, Khwaja, Santal and Sundar; was a native of Habash (Abyssinia). The title Malik was bestowed upon the highest class of nobles, i. e. minister, governors, commanding generals, etc. Epigraphically it is evidenced that he was an architect of Ibrahim Rauza and an executor of the plan and construction of the Taj Baudi. In addition, the construction of some of the massive and decorative buildings of Bijapur and its surroundings that included mosques, tombs of members of royal family especially of the kings, queens, simple or rich; the public utility edifices, etc. that were built in Deccani or foreign styles are ascribed to him.. The famous monuments, such as Golgumbad, caravanserai, a mosque and some wells of Tikota, a mosque in his own name and the *Sarai,* in the north of Bukhari mosque, Malikah-e-Jahan mosque, etc. are credited in his account. In some of epigraphs his name appears. It is cited in historical accounts that he was eunuch, and serving under Malik Ambar, after sometime, perhaps when his master began to receive reverses from his adversaries and also seeing the turmoil state of the Nizam Shahi kingdom, along with other nobles he deserted him and joined Bijapur in 1602. It looked that at Ahmadnagar he was counted among the men of royal palace, and at Bijapur he adopted a peaceful profession of civil engineering. It is most likely that at Ahmadnagar he failed to present his passions on account of the strife torn situation. At Bijapur he got an opportunity to exhibit his mathematical genius and architectural capacities. Dr. Hermann Goetz opines on the basis of average evidences that Malik Sandal took at least ten year to acquire proficiency in mathematics and practice of architecture, that he had been eunuch means that originally he had been non Muslim slave who, by his conversion to Islam, acquired freedom and confirmed it by a pilgrimage to Makkah. And he must also have studied theology. He worked in the Ottoman Empire of Turkey, as one of the younger architects employed in the erection of the famous Blue Mosque of Istanbul, then he started on a pilgrimage and at last being welcomed by Ibrahim Adil

Shah-II, who had learnt of that miracle created in Istanbul. When coming to the Deccan he could have been no more young. At the time of completion of the ornamentation of Ibrahim Rauza, it is presumed that he aged above 40 and below 50, and during the course of building activities of Golgumbad, he died.

In respect of the tomb of Malik Sandal as well different views are persisted. It is believed that he was lay buried in open space of Malik Sandal Mosque in Bijapur, where his mother's grave is also found. It is taken that the female tomb was of his wife. When it is obvious that he was the eunuch, the question of his wife does not arise. The second belief is that he was buried in the cemetery of Ibrahim Rauza. The third view is somewhat based on the weight of historical sources that he was buried in the vault, beside the mosque in the south-west corner of the caravanserai of Tikota, a town about 22 kilometres, in the west of Bijapur. He owned lands in Tikota on virtue of *Inam,* where he retired in his old age.

Throughout his brilliant career in Bijapur he enjoyed great confidence of two great kings of Bijapur, Ibrahim Adil Shah-II and Muhammad Adil Shah. Being Khwaja Sarai, he was a close associate of Taj Sultana and her daughter Zohra Sultana. On account of his abilities and contributions, it seemed, he earned plenty of wealth that he spent for the construction of some of buildings, among them Taj Baudi is also figured.

The earlier and the recent studies advanced various theories in regard to the ascription of Taj Baudi. Some scholars ascribe the beginning of the construction of the well in the reign of Ali Adil Shahi-I, who with an intention of extracting the black basalt stone for the construction of massive outer fort excavated the well. Then the well was completed in Ibrahim Adil Shah-II's time. However, it is slightly differed from this view that the stones extracted might have been more or less sufficient only for the construction of the well's complex. The fort has the length of about three miles which would have required unpredictable huge amount of stone that had been quarried as and when needed from the different sites within and without fort. Henry Cousen writes a story. Then current that Muhammad Adil Shah having done Malik Sandal a great injustice, and wishing to reparation for the same, asked him to name anything he liked and he would grant it him. Having no children through whom to hand down his name to posterity, he asked that he might be allowed to construct some substantial piece of work by which his name might be perpetuated. The king conceded the request and supplied necessary funds, and as a result a memorial had come up. Thus it is suffice to conclude in the light of the solid archaeological evidence discussed above, that Malik Sandal had built the well by expending an amount from his personal purse and the same he dedicated in the name of Taj Sultan, hence, the well is Taj Baudi.

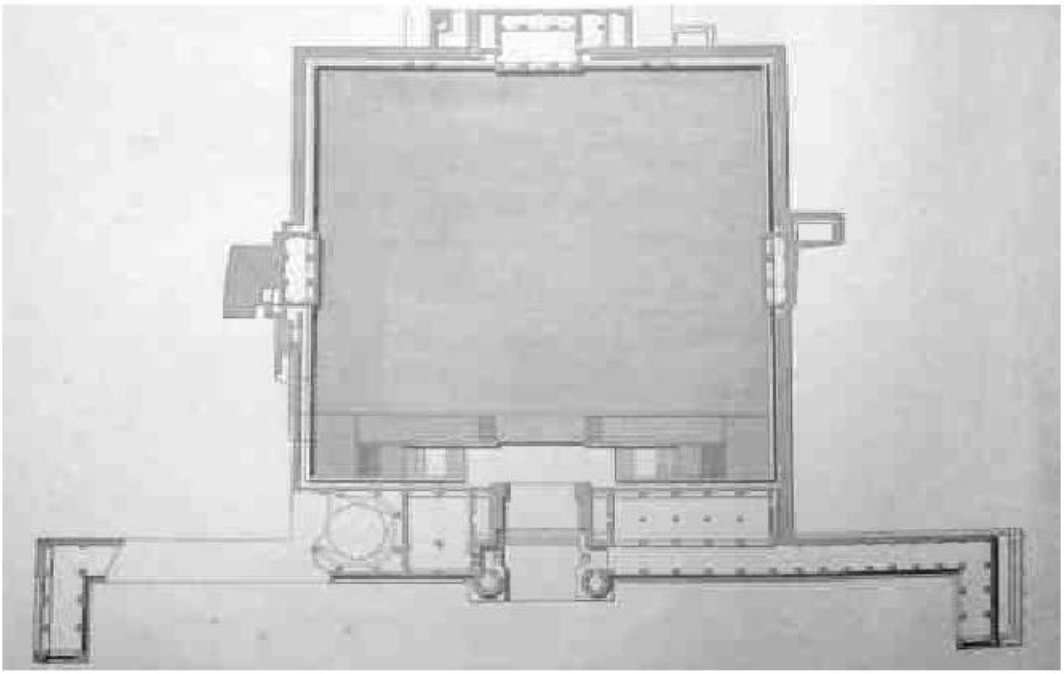
Taj Sultana resting hand on the shoulder of daughter Zohra Sultana

Ibrahim Adil Shah II

Makkah or Arab Gate

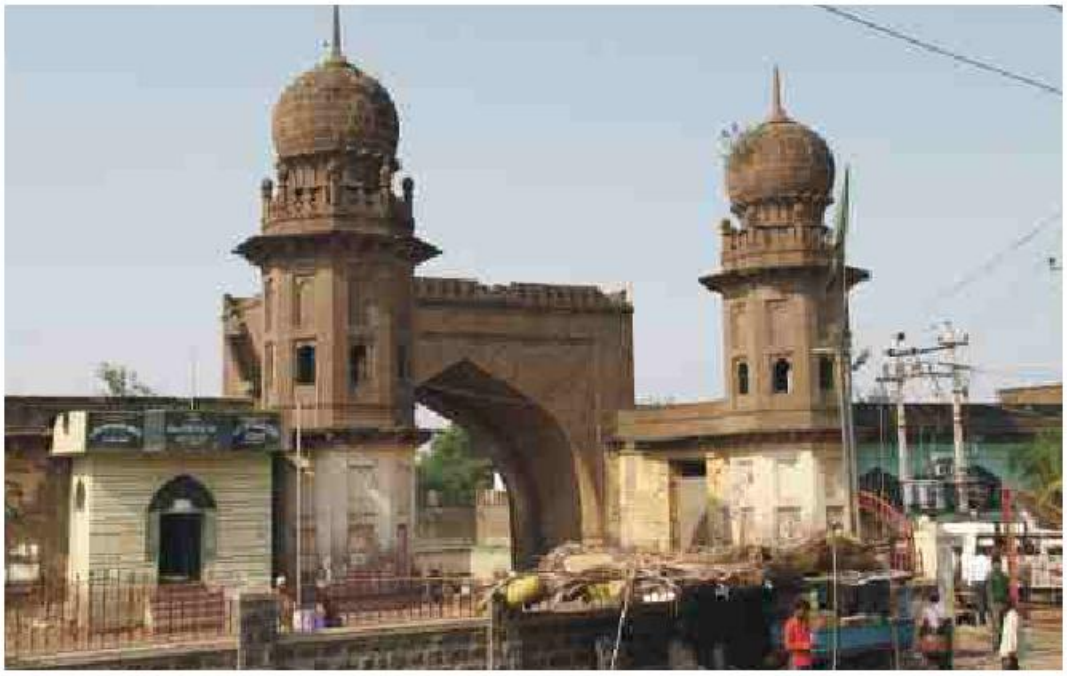
Elevation of Taj Baudi

Top view of Taj Baudi

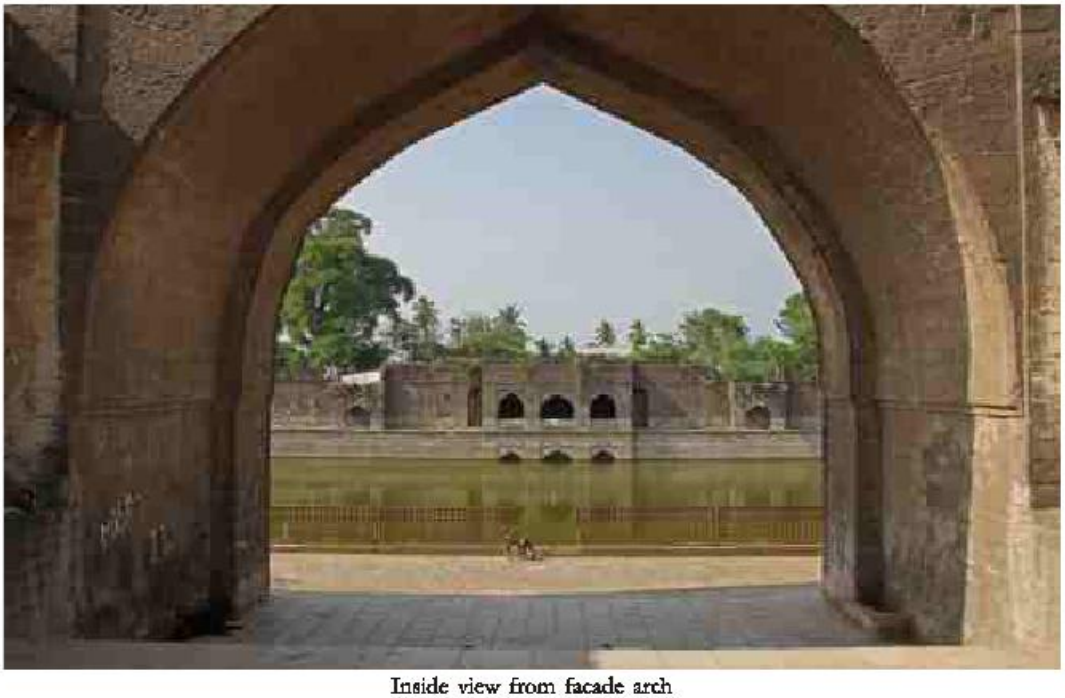


Ground plan of Taj Baudi

Tomb of Taj Sultans; first from the left



Present Gateway of the Taj Baudi

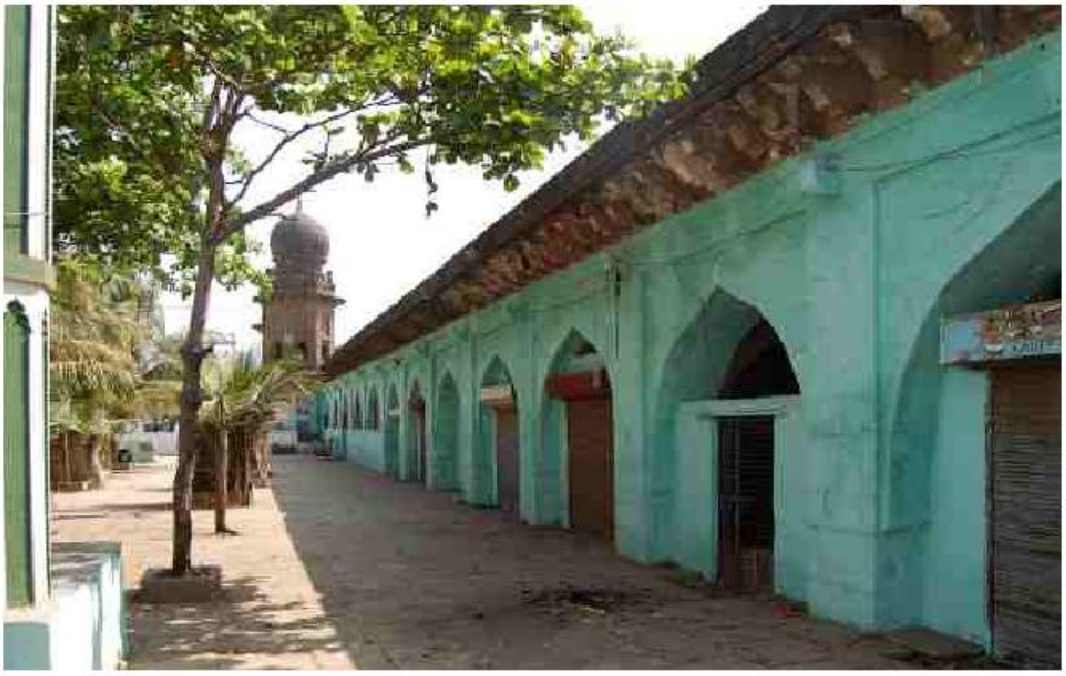


Inside view from facade arch

Inside view from southern chateau

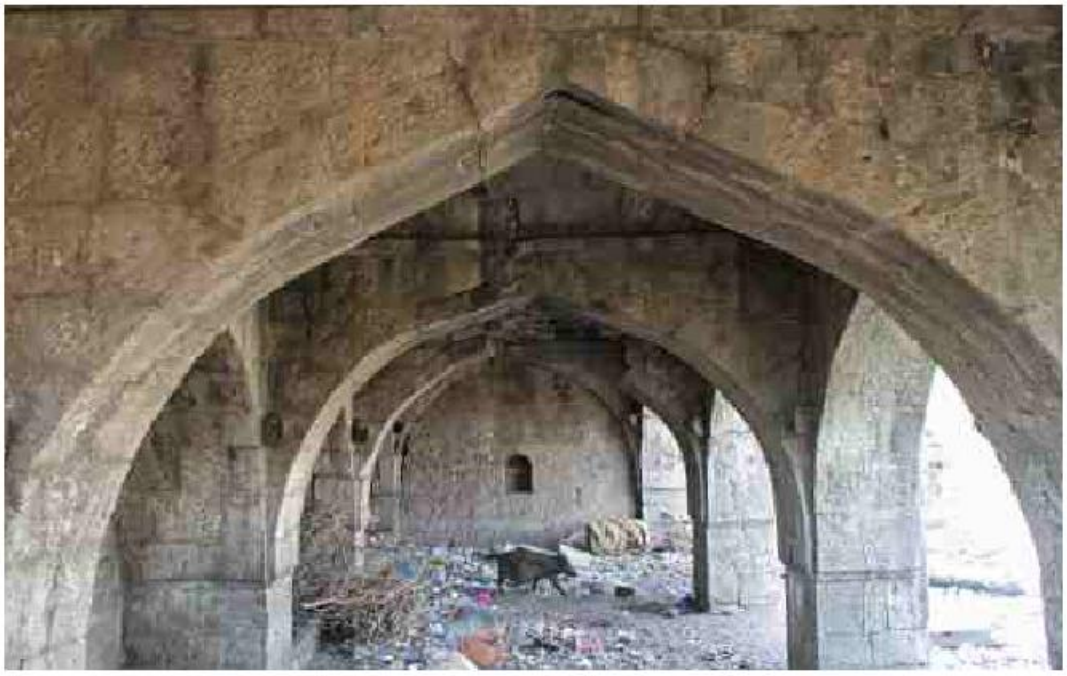
Inside view of Apartments and Facade

Persion Epigraph of Taj Baudi

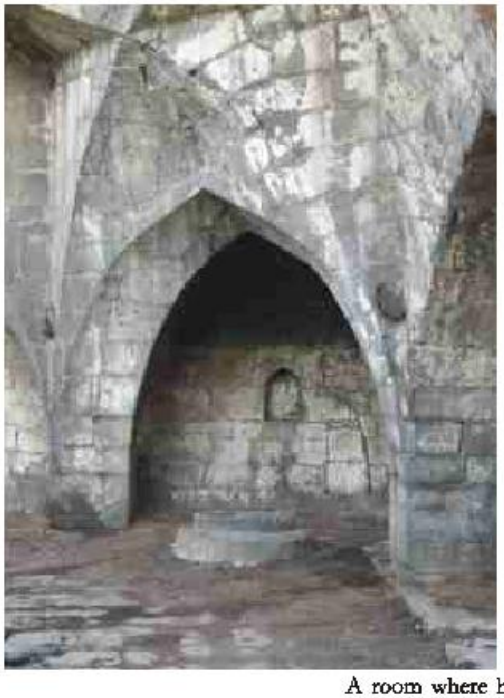


Western apartments and the Sarai

Arches, pillars & ventilation of western apartment



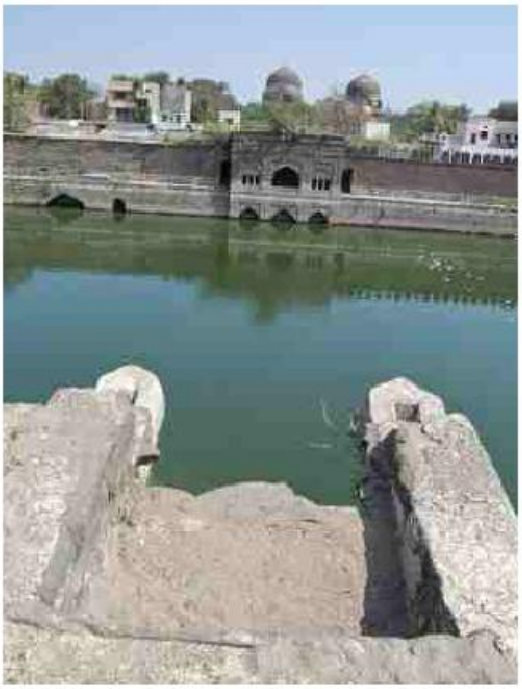
Eastern flank of adjacent apartments



A room where hot water was prepared

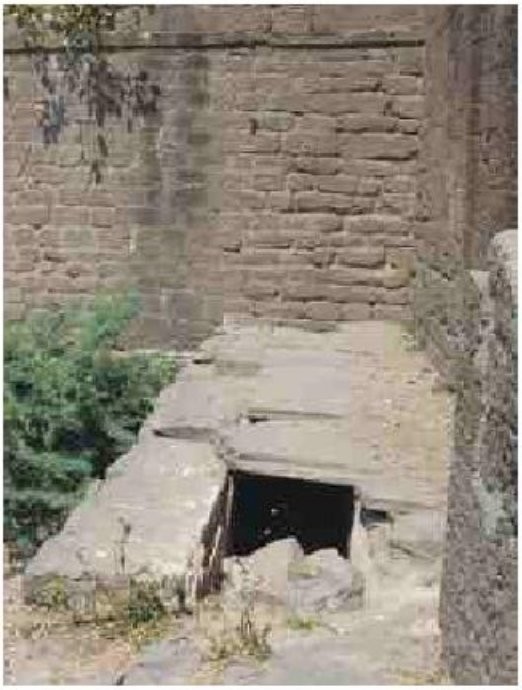
Southern Bathing Apartments

Inlet pipes

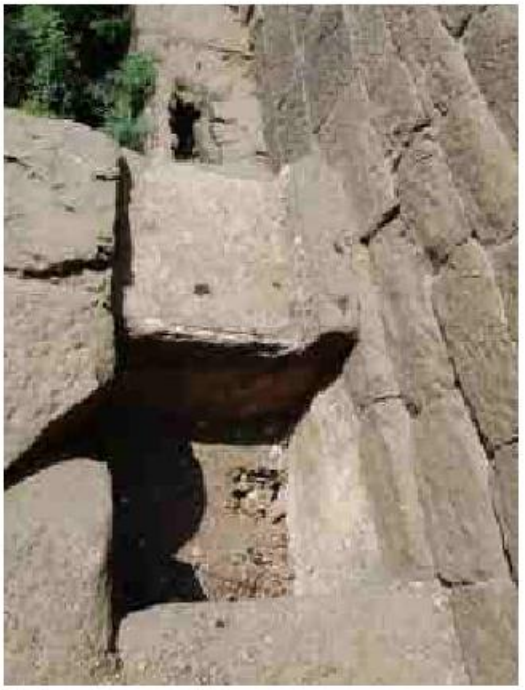


Western mot system

Stone Petals, steps and water channel in the Western Wall



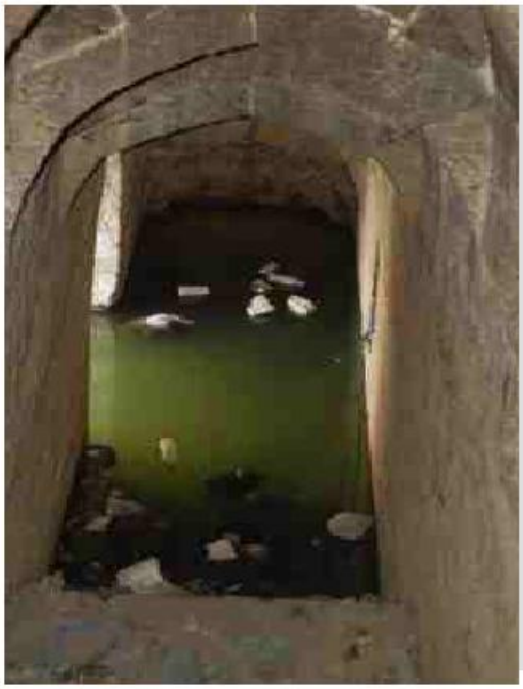
Covered Channel Leading to Western Apartments and Stable



Binary Water Distribution System

Roof Ventillator - Southern side

Tank in the Western Wall



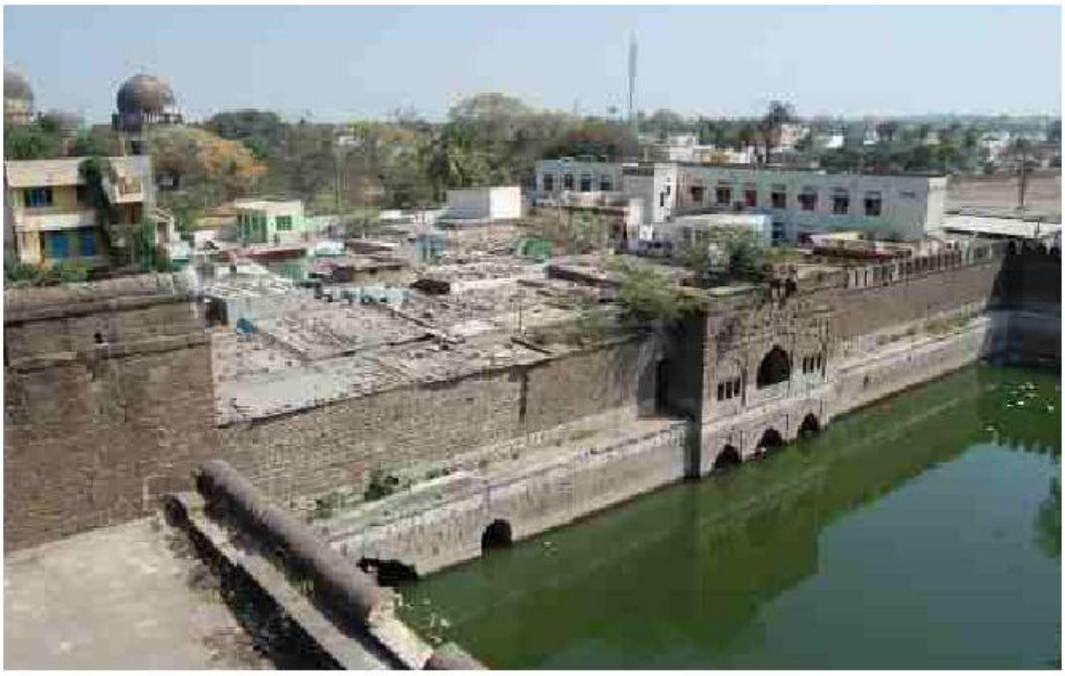
Water in Eastern Chateau

Inside view of Minaret

Door and Windows of the Minaret

Iron Clamp for holding window panels of Minaret

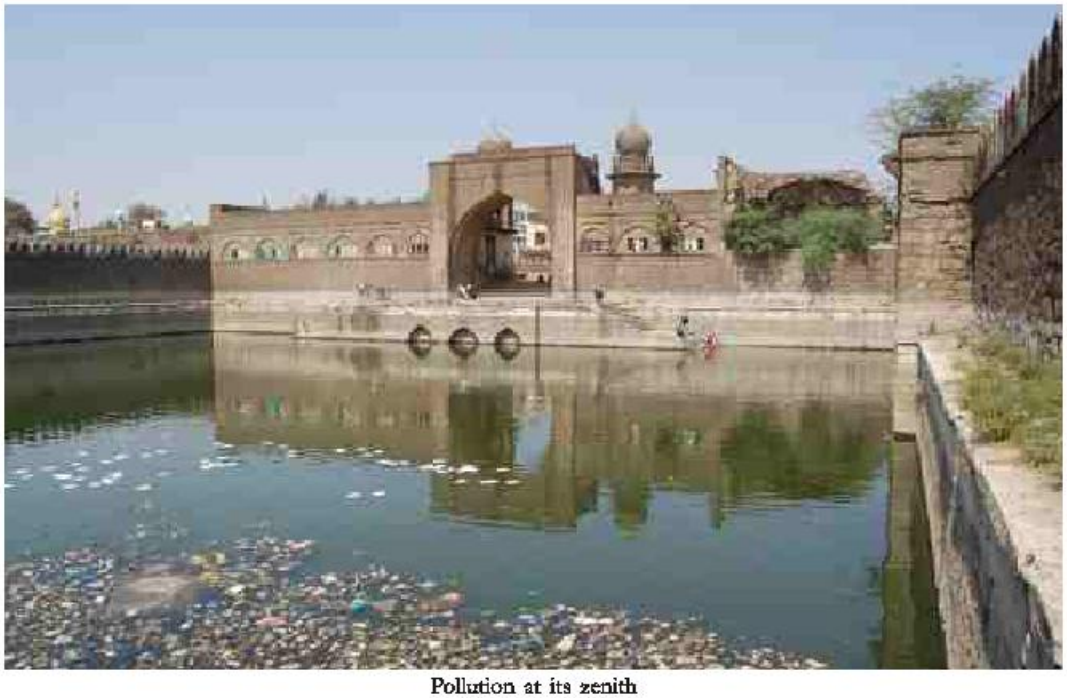
Different views of minarets



Cropped settlements in eastern side of the Well

Settlements around Taj Baudi

Pollution generated due to washing



Pollution at its zenith

Chapter-IV

Taj Baudi; An Ecological Environment

Artistic Imagination of Nature and Water

Clear ponds with wide reed belts often lie in lush green meadows, extending to the fringe of forests. In spring and summer the ponds are covered with a blanket of flowering plants. Everywhere there is life and brisk activity. Above the water is a beautiful mirror for sky and sun, and for the slender white trunks of huge trees. This colorful multiform mosaic of the pond-scape provides a habitat for a wealth of flora and fauna. Whatever the size of the water body, whether pond, pool, well or lake, stream of river, all areas of fresh water enliven and enrich the landscape. It is the increase in monotony of our cultivated landscape, often referred to as "Cultivated Desert" which has made people aware of our natural resources.

The interrelationships within nature's household of the landscape are indeed complex and dependent on each other. Water and landscape are mutually dependent and the link between them is being closer and more versatile. Any changes in the water engineering necessarily influence the whole of surrounding environment. Water thus becomes the most important and prime substance of even a tiny spec of life.

The Adil Shahi rulers, with their love for architectural wonders also had a scientific approach for the civic needs, which is made lively even till today by their construction of huge magnanimous and beautiful water bodies in the name of their queens both for entertainment as well as for the usage purposes.

The colonial writers, who visited Bijapur in whole of the 19th century and the first half of the 20th century praised the historical remains of the erstwhile capital city of Adil Shahi kingdom. Meadows Taylor described in this way the sense of desolation which meets the traveler directly when he enters the walls of Bijapur. He writes, "But mournful as it is the picturesque beauty of the combinations of the buildings, the fine old tamarind tree and *Pipal* trees, the hoary ruins and distant views of the more perfect edifices combine to produce an ever changing and impressive series of landscapes. Nowhere in the Deccan, not even at Bidar, at Gulbarga or in the old fort of Golconda is there any evidence of general public taste and expenditure, like that proved by the

remains in Bijapur- and for days together the traveler, or sketches will wander among these remains with his wonder still excited and unsatisfied". Henry Cousen describes, "Bijapur has been called the Palmyra of the Deccan. As with the Palmyra the traveler comes upon a city of ruins, across miles of barren country".

A court chronicler Muhammad Qasim Farishtah writes that it was Ali Adil Shah-I who gave serious thought to the problem of water supply. With the order of king, his minister Kishwar Khan, the supervisor of the construction of the fort made arrangements for bringing water through canals from a distance of five *Kos* (about 15 miles). Such water was collected in a huge and large tank built near the fort called *Karanji* (water towers).

The Adil Shahis knew, life cannot exist without water and water takes the first place in the priority list of the life. The historical wells built by the kings are a witness at every step as to how much they cared for their people. They made water system throughout their kingdom which was meant for adequate, reliable and safe supply of water for drinking, irrigation and recreation. Though the availability of water in Bijapur is plenty, a time has come to conserve it.

Water itself is an environment, supporting a large number of organisms. But this environment is being highly affected. The world wide problem of increasing pollution of water is an additional factor as health and well being are dependent on the quality of water. The Adil Shahi kings built huge water bodies and wells to help their subjects and people. These wells are architectural wonders; un-dried, full with water and showing their liveliness in the names of kings and queens who ruled Bijapur. Taj Baudi is such a wonder, a living water legend. The catchment areas like Jahan Begum Talab and Torvi tank built by the royal dynasty have dried up. As history and historians explain, water was led from these tanks in a well planned manner through canals to the inner tanks or wells. But the survival of these wells fully charged with water, even though the catchment area has dried- speaks about the natural springs existing in the wells and particularly in Taj Baudi.

The principal tanks and wells in city are the great Taj Baudi, which is largest and the most important, Chanda Baudi near Shahpur gate, Badi Baudi and Mubarak Khan's Baudi, in the south-east, the Ilal and Nagar Baudis and the Jami Masjid Baudi, to the south of the Jami Masjid. There were many other large ones, the ruins of which may be seen, but they have been neglected and they hold no water.

The Taj Baudi is the noted reservoir of water in the city, historically an ancient one as a remembrance of Taj Sultana and Ibrahim Adil Shahi II, built by the royal engineer Malik Sandal. All the Baudis, tanks, and water systems of Adil Shahi Sultans, give the clear picture and transparent view of their foresightedness and love for the natural

environment to face the basic needs of their people. As stated earlier the style of Islamic and Persian architecture makes these structures unique. Even after more than 350 years they stand as huge structures to tell their stories of past history, present ecology and make one to think of the future as to what will happen to them. For the present ecological study, Taj Baudi – located in Bijapur city was selected. The historical city extends between 16o 49' to 16o 50' north latitude and 75o 42' to 75o 44' east latitude. The annual rainfall is 55.8 mm. which is comparatively low. The minimum and maximum mean temperatures are 23o C and 43o C. Bijapur is situated at a contour between 570 m and 600 m above MSL and is very dry place with zerophytic vegetation.

Scientific approach of the Adil Shahi kings has made these wells still alive as legends, full with water even if there is no rain to Bijapur district. At one side of the well there is a spring and has the greatest depth- which is to the right side of the entrance to the well. At this area water is lifted to the nearby plantation for the irrigation purpose. Taj Baudi is exposed to sunlight devoid of macro vegetation and becomes stagnant water. Earlier this water was used for gardens of Golgumbaz, but recently it is totally an unused one, which needs aeration by passage of oxygen gas and other bacterial activity to force it to be utilizable.

Observing at this historical architectural beauty, remembering the past its utility and negligence today a scientific study also has been carried out to know the complete environment and ecology of the ecosystem of Taj Baudi as a whole. At present it is surrounded by colonial residential houses all around, which seep their waste water through the inlets to Taj Baudi. This is how the defiling of the natural environment by the waste unwanted pollutants takes place. This, in constant method is creating an environmental pollution – a threat to the future sustainable life in the well and the surrounding. Thus the eutrophication of water of Taj Baudi is occurring. In simplest sense it means pollution of water or enrichment of nutrients is taking place and resulting in degradation of its quality. The water in the historical times was used for drinking, irrigation and recreation. Today it is used for washing of clothes, dumping idols and letting domestic seepage also. As the historical well – Taj Baudi not only sings the king's love for his queen Taj Sultana, but also narrates her remembrance amongst the public and the people through the supply of the essential need that is water to mankind.

Hence the present study reads out not only the past history where Ibrahim Adil Shah II had love for nature, plants, environment and use of water to his subjects, but depicts its real story of the water with scientific approach to reveal the truth of water's ecological condition. If the people, the authorities and the government put their mind for the improvement it can be a great source of water to the draught place like Bijapur.

In the past few decades natural and polluted waters have been studied in detail all over the world and a considerable data is now available. The environmental study of well waters with springs has been influenced by climatic changes. Still waters with their extreme low rate of water renewal and their largely closed system are much more sensitive to pollution than running waters. Hence the study of Taj Baudi becomes unique observation to know the impact of environmental factors on the biotic components of the water, especially in depth profile. The dumping of the wastes of all kinds has resulted in the deterioration of the quality so much that it is not fit to be used for domestic purpose. But still the nature has its own mechanism of self purification with the growth of algae, bacteria and other living organisms like fish to make the water to its own pure condition.

Scientifically in Taj Baudi – water has shown unique results with the environmental factors studied. The temperature is a physical factor indicating the quality of water. It has effect on the growth and distribution of aquatic life and concentration of dissolved gases and chemical solutes. Maximum temperatures were observed during the months of June and July at surface.

Vertical Thermal Variation

As Taj Baudi is of great depth in its architectural structure, the water shows strange and unique observation with the factor of temperature. Normally in most part of the study period the water temperature decreased from surface to depth. At a particular depth, constant temperature variation is observed. This is scientifically attributed to the formation of thermal stratification in stable water bodies (Ref: Ganapati, 1960, Zafar, 1966).

Inverse Thermal Stratification

An exceptional inverse thermal stratification has been attained in the months of December and January every year. In these months there is severe cold in Bijapur due to its geological status. As it is also on the Deccan plateau, the rocky bed of the ancient wells like Taj Baudi show unique observations and conditions. The atmospheric temperature goes very low during this condition, the waters of the upper strata of Taj Baudi water (surface water) show slightly less temperature than air. As the deeper strata (at 3mts., 6 mts. and 9 mts.) are studied, the water temperature increases with the increase in depth. This phenomenon is called as Inverse Thermal Stratification, which is very common in temperate lakes. It is attributed to the formation of some kind of chemical stratification where the increase in density due to rise in temperature is not sufficient to overcome the increase due to dissolved salt concentration. Such observations are not found in other ancient wells built by the Adil Shahis. This may be

again due to the magnanimous structure and depth of the well. As the well has completely a rocky bed, typical to geological and geographical features of the Deccan plateau – these kinds of scientific phenomena are observed.

These factors show an impact on the ecological condition of Taj Baudi. Generally during winter when the temperature is very low we observe a fish kill in the well. This can be explained as – when the surface water becomes very cold, fish will try to move to the lower layer because the deep water is warmer compared to the surface water. But the deeper layers of water lack in dissolved oxygen which will cause a mass mortality of fish.

In the present study, the phytoplanktonic algae in Taj Baudi are studied with the bacterial densities. As the water is eutrophicated, the bacteria- Escherichia.coli which is a fecal bacteria is observed in huge density with the occurrence of glucose, creatinine, protein, urea and uric acid. All these are derivatives of decaying of plants, bacteria and animal tissue. The sensitivity of the ecosystem of Taj Baudi greatly declines and dynamic equilibrium is supported chiefly by the biotic interactions between dominant organisms. Thus the dominance of the bacteria indicates the susceptibility of these wells to contamination. The contribution of Adil Shahi kings to the society had to be used in future as Bijapur is drought prone. An investigation of the communities inhabiting the water, therefore reveals the condition of the water and under the aspect of utilization of the water, the condition is referred as quality conditions.

Sampling and Analysis

The collection of the water samples of Taj Baudi was made once in a month at the fixed spot from January 2008 to December 2009, from surface and at the depths of 3 mts., 6 mts., and 9 mts. using Van Dorn water sampler to study the physico - chemical and biological factors.Water samples were collected in polyethylene carbuoys of one liter capacity. The sample collections were made from 8-30 am. to 9-30 am. Temperature and pH were recorded on the spot and winklerisation was made on the spot for the estimation of dissolved oxygen. All other factors were analyzed in the laboratory on the same day immediately. Another half a liter of the water sample was collected separately and given to the Department of biochemistry BLDE Medical College, Bijapur for the analysis of biochemical parameters like glucose, urea, uric acid, protein and creatinine.

Simultaneous collections of the surface water were made in sterilized container for the microbiological study. Samples were given immediately to the Department of Microbiology, BLDE Medical College, Bijapur for E-coli count. The most probable number of E-coli was counted.

Physical Parameters Temperature

Average temperature of the surface water and average temperature of water at different depths was measured using thermometer after the samples were collected.

Chemical Parameters pH

It has been measured on the spot using pH meter. Free carbon dioxide, dissolved oxygen, carbonates, bi-carbonates, magnesium, sodium, potassium, hardness, chloride, iron, simica, phosphokjrouks, organic matter, free ammonia, organic nitrogen, nitrate, calcium, glucose, protein, urea, uric acid and creatinine were measured by the standard methods and using auto analyzer.

Phytoplankton, Sampling and Estimation

Samples for the identification of phytoplankton were collected from the surface and at various depths of 3 mts., 6mts. and 9 mts. once in a month. One liter of water sample was collected every time at fixed spot. Fixation and sedimentation were made in 4% formaldehyde solution and the supernant liquid was decanted. The solution was concentrated to 30 ml and preserved in suitable container. Phytoplanktons were identified with the help of Monographs and papers like

1. DIE SUSSWASSER Flora by Husted, 1930
   Mittel EUROPAS
   Heft 1
   Bacillariophyta (Diatomaceae)
2. Chloriciccales by, M. T. Philippose, 1959
3. Cyanophyta by, T. V. Deshikachary , 1959
4. Euglenophyta by, M. T. Philipose Part I, II, and III ,
   1982, 1984 and 1988
5. Indonesian Desmids by, A. M. Scott and G. W. Prescott, 1961

Water Temperature

A range of 23.3 to 31.1o C at surface, 23.0 to 30.0o C at 3 mts., 23.0 to 30.0oC at 6 mts. and 22.0 to 30.0oC at 9 mts. was observed.

Hydrogen Concentration (ph)

pH of the Taj Baudi water was alkaline in nature throughout the study period. They range between 7.3 to 9.3, 7.6 to 9.1, 7.7 to 9.6 and 7.6 to 8.4 at surface, 3 mts., 6 mts., and 9 mts. respectively. The average pH is 8.24.

Free Carbon Dioxide (Co2)

In the whole of the study period, free carbon dioxide was found absent in Taj Baudi water. This indicates very high algal activity. Algae are the plants which use CO2 for photosynthesis.

Carbonate (CO3)

An average value of carbonate concentration is found to be 31.97 mg/lit, which is very rich. A fluctuation between 12.0 to 26.4 mg/l at surface, 3 mts. and 6 mts. At 9 mts. the concentration of carbon dioxide was 4.8 mg/l. in the month of October and November.

Bicarbonates

An average of 294.2 mg/l. was observed throughout the study period.

Total Alkalinity

A high concentration of total alkalinity was observed in Taj Baudi similar to the bicarbonate concentration and the average concentration was 293.47 mg/l.

Dissolved Oxygen (DO)

Dissolved oxygen concentrations fluctuated between 1.2 mg/l. to 5.4 mg/l. at surface, 1.8 to 5.2 mg/l. at 3 mts., 1.0 to 4.8 mg/l. at 6 mts. and 0.6 to 4.8 mg/l. at 9 mts. depth. Low dissolved oxygen indicates unfavorable condition for the biological life of the water in Taj Baudi.

Dissolved Organic Matter and Organic Nitrogen

A highest of 19.0 mg/l. of organic matter was observed in Taj Baudi in the month of March at 9 mts. depth. The concentration varied from 1.0 to 17.0 mg/l. 5.0 to 17.0 mg/l, 1.0 to 18.0 mg/l and 6.6 to 19.0 mg/l for organic matter and 0.3 to 5.7 mg/l, 0.4 to 5.5 mg/l, and 1.2 to 6.7 mg/l for organic nitrogen at surface, 3 mts., 6 mts. and 9 mts. respectively. High values of dissolved organic matter indicate, the advanced pollution status.

Sodium and Potassium

Sodium concentration ranged between 344.8 to 434.5 mg/l at surface, 365.5 to 427.6 mg/l at 3 mts., 310.36 to 420.7 mg/l at 6 mts. and 390.8 to 427.6 mg/l at 9 mts. in Taj Baudi.

Potassium concentrations in Taj Baudi were very high in few months above 250 mg/l. A range of 44.18 to 207.2 mg/l at surface, 41.83 to 215.0 at 3 mts., 52.03 to 250.2 at 6 mts. and 59.82 to 246.3 mg/l at 9 mts. Both Sodium and Potassium

concentrations in water are the indicators of salinity and the high values indicate that the water is saline.

Calcium and Magnesium

Magnesium was the dominant cation over Calcium. An annual average of 160.62 mg/l was observed for magnesium. The calcium concentration fluctuated between 10.3 to 34.1 mg/l at surface, 10.5 to 33.9 at 3 mts., 11.2 to 30.4 mg/l at 6 mts. and 12.2 to 20.0 mg/l at 9 mts.

Chloride

Taj Baudi water was rich in chloride concentration with a minimum of 345.6 mg/l and a maximum of 689.3 mg/l.

Hardness

Hardness ranged from 426.0 to 860.0 mg/l at surface, 426.0 to 840.0 mg/l at 3 mts., 374.0 to 822.0 mg/l at 6 mts. and 700.0 to 802.0 mg/l at 9 mts. depth. Hardness of the water is due to the concentrations of Calcium, Magnesium and chloride.

Iron and Phosphate

Iron concentrations of Taj Baudi fluctuated between 0.2 to 2.0 mg/l at surface, 0.02 to 1.8 mg/l at 3 mts., 0.06 to 1.96 mg/l at 6 mts. and 0.1 to 0.34 mg/l at 9 mts.

Phosphorous concentrations exhibited a range of 0.5 to 3.1 mg/l at surface, 0.7 to 2.7 mg/l at 3 mts., 0.5 to 2.3 mg/l at 6 mts. and 0.3 to 1.3 mg/l at 9 mts.

Silica

Silica concentrations varied from 2.0 to 8.0 at surface, 2.0 to 8.0 at 3 mts., 2.0 to 10.0 mg/l at 6 mts. and 0.0 to 4.0 mg/l at 9 mts.

Iron, phosphates and silicates are observed in the water of Taj Baudi as the products of sedimentation. The well is situated in the Deccan plateau and has a rocky bed. As a result, since long the rocky materials and particles add to the chemical constitution of water.

Biological Parameters

An investigation of the communities inhabiting the water, therefore reveals the condition of the water and under the aspect of utilization of water, the condition is also referred as quality condition. While physical and chemical parameters reveal the present condition, the biological analysis covers a longer period of the time because species of animals and plants are not subject to quick changes. The study of phytoplankton ecology contributes to an understanding of the basic nature and general

economy of the fresh water body. Generally a lake or a water body is considered as an ecological complex of a very high order or briefly as an "Eco System" composed of biotopes and biocoenosis. However, in spite of all the factors, the phytoplankton coexists in a community. The Cyanophycaea are highly successful group and enjoy wide distribution in the present study. Diatoms are more flexible and resistant in the present water rich in organic matter. The desmids which are strict aquatic fresh water algae, unable to withstand even negligible quality of the habitat are showing their existence with their pollution tolerant nature.

The bacterio-plankton studies reveal their importance with the dominant species of E-coli. On the whole, there is a beautiful and natural symmetry expressed in the biological science between the seasonal changes to the bacterio plankton and the phytoplankton of water. Thus in the present study, both the groups algae and bacteria were resistant to the environmental fluctuations, closely coupled by the competitions, mutual separation and support. At this stage sensitivity of the eco-system of the environmental factor greatly declines and dynamic equilibrium is supported chiefly by the biotic interactions between the dominant species. The dominance of E coli in open wells clearly indicates the susceptibility of these wells to contamination. It is due to the enrichment of organic matter in the well water.

Conclusion

Water quality and limnological studies of Taj Baudi has revealed the nature's most interesting phenomenon of physico-chemical, bio-chemical, phyto and bacterioplanktonic structure to give the picture of the ecology and ecosystem. The co-existence of algal bloom with the bacteria is the nature's purifying mechanism of water by circulation and oxygenation, decreasing the chemical pollution of the water quality. As Bijapur is a drought place in the Deccan plateau, the water of historical well – Taj Baudi can be used for recreation, gardening and it can be converted into potable water. The monumental heritage of Adil Shahis, TAJ-BAUDI, thus can be protected and conserved with its natural heritage- WATER.

Chapter-V

Conclusion and Epilogue

Taj Baudi is a legendary water body of historical and monumental importance. It is the standing land mark in the history of the Adil Shahis to depict their knowledge and foresightedness in constructing huge magnanimous hydraulic works and water system for the public utility. Their remembrance shines in a faded manner for their love of their queens, royal luxuriant life style and for their dedicated commitment to the basic amenities of their countrymen and public in supplying drinking water at reach.

Taj Baudi, the monumental heritage with its natural heritage water is even today a wonderful and interesting research topic in drawing the attention of most of the scientists, environmentalists and the historians. The hydraulic work of the water system of the well shows the survival of the water body for more than 393 years with its own natural symmetry of physical, chemical and biological factors.

On the Deccan tableland, rainfall is scarce and occurs essentially during the monsoon from July to September. In this dry region people regard water bodies and luxurious vegetation as marks of divine intervention. The ruler was not only the guardian of the country, he was also expected to make the rainfall and the ground water fills the small and big Baudis. The water source, reservoir springs had to be at higher levels. To fulfill the needs of the people, the Adil Shahis are the first amongst the rulers in the country to execute and bring out beautiful engineering techniques in the preservation, conservation and supply of water in their kingdom. The hydraulic study of water works of Adil Shahis reveals the existence of catchment areas, the tanks, big wells and *Ganjs* throughout their kingdom which helped to grow the greenery of the kingdom. As a result, gardens were good omens and signs of heavenly protection. The ideal world that the Adil Shahis dreamt of was a verdant garden full of fruits and flowers, with flowing water, Baudis, pools and fountains. Every house is explained to have plants of Bougainvillea and a fountain. During such luxuriant rule, the wells like Taj Baudi were constructed with water specialists coming from Iran and other regions of the world, introducing novel techniques with an almost scientific approach to geological and physical realities. These specialists had experiencing knowledge in obtaining more water from renewable sources. They thought of dams,

transport water over long distances, beautification and recreation of landscapes of palaces, tombs, mosques by displaying in constructing water wells and fountains.

There was a religious attitude of the kings and the people towards water. People were forced to command and believe that water is the need of life and fertility. But unfortunately the same water bodies of the Adil Shahis remain most neglected and unused. The entire district is declared as a 'drought prone and barren region', with acute scarcity of water with no measures taken by the administration.

Till the end of the 20th century the water of more than sixteen wells within the fort walls was used purely for drinking purpose. Some of the prominent ones were Taj Baudi, Chanda Baudi, Neem Baudi, Maa Sahab Baudi, Jamia Masjid Baudi, Hashim Pir Baudi and so on. At the entrance, there were inscriptions to indicate that the water should be kept pure, clean and not to be touched by dirty hands. To consider them as holy there was a system of practice also to keep the idols of deities in the premises of the well. But unfortunately today they have become the dumping places for all sorts of garbage and wastes. Some of them have been silted and closed in order to construct roads or have been encroached for building purpose. Many of the existing wells like Taj Baudi have become the places for the neighbouring colonies to let seepages of sewage and domestic wastes into it. The district authority has allowed putting the idols during the festivals of Ganesh into the well. Washing clothes and putting temple waste are very common. Even in doing so, the situation gives the importance of the water of Taj Baudi as holy mother to the local people.

Such is the destination of a beautiful historical well – with architectural beauty, built by the Adil Shahi kings. Scientific projects can make, Taj Baudi – a major source of water to Bijapur. Between, 1901 to 1910 Bijapur suffered with a severe famine. All the wells in Bijapur were dried up except Taj Baudi, since it is a huge water body with large number of natural springs. As with the reference from the work published on the "Centenary of the Bijapur Municipality" the officers from Bombay province to which Bijapur belonged, visited drought prone city many times and suggested to maintain these wells by de-silting, keeping them clean and make them available to public as a drinking source. Sir M. Vishveshwarayya, the then sanitary engineer of Mysore was invited to give a solution for water problem of Bijapur. He suggested for the construction of a tank at Bhutnal *Tanda,* near Bijapur and this can take care of the water needs of the whole city very efficiently. But local people and officers opined for the rebirth and maintenance of the Adil Shahi wells and the water distribution system. But Sir M. Vishveshwarayya convinced all the people and gave a new project of Bhutnal tank with water distribution system. Instead, if the wells were taken up to revive then even with the lesser revenue, the historical water sources could live

supplying rich water for drinking, even till today. Some of the old tanks of the Adil Shahis like Allahpur tank, Jahan Begum tank and Ramaling Khind tank are now closed either by filling, building roads and encroachment for construction. The modern engineers and the government do not think for the restoration of the old historical wells (more than 400 years old) which still live with their own natural springs.

Even today the government needs to be attentive in taking measures for the protection and conservation of Taj Baudi which is a monumental heritage, in the most appropriate scientific manner. Along with Bhutnal tank, if Taj Baudi and few other wells had been selected and thought of for retaining the water table, Bijapur would not have faced water scarcity. Presently Taj Baudi can be taken as a scientific project to improve the water quality and make the water potable.

Water Treatment

According to our present research Taj Baudi gets contamination from seepage, domestic waste, the washing impurities, high bicarbonates, contaminants from waste water and household seepage. This leads increased levels of chlorides, salt content and biochemicals like glucose, protein, creatinine, urea and uric acid. The treatment of Taj Baudi water includes physical, chemical and biological processes to remove the contaminants. Its objective is to produce environmentally safe water meant for utility. By using advanced technology it is now possible to reuse the polluted water for drinking purpose. Water treatment methodologies are many with respect to the contaminants. Chemical treatment involves, chemically breaking it down through the use of micro organisms. As Taj Baudi is a huge water body, the chemical treatment becomes difficult. The dissolved oxygen content of this water can be improved by using sprinklers and water agitators. This will result in the circulation of the water and increases oxygen. As a result, increased dissolved oxygen decreases the pollutants like organic nitrogen, dissolved organic matter, organic phosphorous, ammonia, sulphides, etc. The only way best, can be applied is the mechanism of Reverse Osmosis. Water tanks built outside the well with R.O. system and supply of potable water can be very well practiced within the boundary of Taj Baudi. This method does not affect the historical structure, and helps to maintain the beautification by gardening and lighting around the edifice. By doing so the heritage building with its old past glory can be preserved in scientific manner. Simultaneously, the colony and the slums that surround the structure should be separately accomplished and furnished with toilets, wash rooms and washing facilities, at the same time not contaminating the well water. Strict security and vigilance is required to observe its preservation.

Biologically another treatment is to be given by means of the environmental microbiological method. A pilot project plant should be prepared by growing the least resistant variety of bacteria in the water as in Taj Baudi. With genetic engineering, making it resistant to improve the water quality (increasing the dissolved oxygen) the respective variety of the microbe has to be grown in large and the water has to be made pollution free and potable. Slowly it goes on improving and maintaining the water quality for longer time. Thus, if both methods are adopted in a scientific manner, water purification is brought about with pollution free state of water. Thus the large monumental heritage will be preserved and conserved along with the natural heritage – WATER – which is a remarkable long standing research approach. Thus in doing so, at Taj Baudi, history of the Adil Shahis can be remembered and preserved not only archeologically but as a present ecological eco-system of the water body. Taj Baudi can be used scientifically to the city of Bijapur.

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East wing of the Taj Bauri, Bijapur (Photograph: Cousens, Henry in 1880)

Dr. Geeta. S. Patil, Professor, Department of Botany and Environmental Studies at B.L.D.E. Association's S. B. Arts and K.C.P. Science College, Bijapur, is a well known research scholar and scientist in the field of Environmental and Hydraulic Studies. She has her contribution, extensively in the field of Biodiversity. Research of Bijapur water works with the environmental status of the historical importance has made her an unique scientist in exploring the scientific approach of the Adil Shahis in the past history. The interdisciplinary research of history, scientific and architectural work stand for her contribution in the hydraulics of Adil Shahi works at Bijapur. The biodiversity during the period of Adil Shahis, existing till today is also one of her works. Research contribution of the oldest plant Adansonia digitata - Baobab, a living legend from the times of the Adil Shahis at Bijapur, is also for her credit. The wells and tanks of the Adil Shahis, rivers of Bijapur, etc. are extensively worked by her to study the environmental aspect.

The greater impact of her works has been to conserve, preserve and protect the Monumental Heritage of Bijapur with the Natural Heritage that is WATER. She has to her contribution extraordinary number of presentations in national and international conferences and publications of research articles in international journals. To her explorations, some of the unique research results are observed in Taj Baudi, for which she is the recipient of *PARISARA PREMI* Award from the Government of Karnataka. As an environmental scientist with historical approach, she has been interviewed by the press media of state and national levels.

Dr. Abdul Gani Imaratwale, Professor and Head, Department of History and Archeology at the Anjuman Islam's Degree College, Bijapur is a renowned scholar in the History and Sufism of Bijapur. He has amassed collection of copies of rare manuscripts and published works relating to the subject. He transcribed and translated many unpublished *Farmans, Sanads* and other rare Documents. He authored 5 books, and 40 articles in Urdu and English, which have been published in a wide range of academic journals. The greater impact of his works, however, has undoubtedly been to broaden the interest in and concern for the history and heritage of Bijapur. He has given an extraordinary number of presentations on various titles at numerous national and international conferences and seminars. Now and then the indigenous and foreign scholars consulted his expertise. To his credit there are few explorations of Archeological sites in and around Bijapur. As a local historian, he understood the minute details of Bijapur History; hence, he enjoys prime status in the field of research. Some of the state and national TV channels interviewed him on the subjects concerned.